NASA/SP—1998-7011/SUPPL460
March 9, 1998

AEROSPACE MEDICINE AND BIOLOGY

A CONTINUING BIBLIOGRAPHY WITH INDEXES

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Typical Report Citation and Abstract

❶ **19970001126** NASA Langley Research Center, Hampton, VA USA
❷ **Water Tunnel Flow Visualization Study Through Poststall of 12 Novel Planform Shapes**
❸ Gatlin, Gregory M., NASA Langley Research Center, USA Neuhart, Dan H., Lockheed Engineering and Sciences Co., USA;
❹ Mar. 1996; 130p; In English
❺ Contract(s)/Grant(s): RTOP 505-68-70-04
❻ Report No(s): NASA-TM-4663; NAS 1.15:4663; L-17418; No Copyright; Avail: CASI; A07, Hardcopy; A02, Microfiche
❼ To determine the flow field characteristics of 12 planform geometries, a flow visualization investigation was conducted in the Langley 16- by 24-Inch Water Tunnel. Concepts studied included flat plate representations of diamond wings, twin bodies, double wings, cutout wing configurations, and serrated forebodies. The off-surface flow patterns were identified by injecting colored dyes from the model surface into the free-stream flow. These dyes generally were injected so that the localized vortical flow patterns were visualized. Photographs were obtained for angles of attack ranging from 10’ to 50’, and all investigations were conducted at a test section speed of 0.25 ft per sec. Results from the investigation indicate that the formation of strong vortices on highly swept forebodies can improve poststall lift characteristics; however, the asymmetric bursting of these vortices could produce substantial control problems. A wing cutout was found to significantly alter the position of the forebody vortex on the wing by shifting the vortex inboard. Serrated forebodies were found to effectively generate multiple vortices over the configuration. Vortices from 65’ swept forebody serrations tended to roll together, while vortices from 40’ swept serrations were more effective in generating additional lift caused by their more independent nature.
❽ Author
❾ *Water Tunnel Tests; Flow Visualization; Flow Distribution; Free Flow; Planforms; Wing Profiles; Aerodynamic Configurations*

Key

1. Document ID Number; Corporate Source
2. Title
3. Author(s) and Affiliation(s)
4. Publication Date
5. Contract/Grant Number(s)
6. Report Number(s); Availability and Price Codes
7. Abstract
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9. Subject Terms

AEROSPACE MEDICINE AND BIOLOGY

A Continuing Bibliography (Suppl. 460)

MARCH 9, 1998

51
LIFE SCIENCES (GENERAL)

19980009302

Real-time pose estimation of 3-D objects from camera images using neural networks

Wunsch, P., German Aerospace Research Establishment - DLR, Germany; Winkler, S.; Hirzinger, G.; Proceedings - IEEE International Conference on Robotics and Automation; 1997; ISSN 1050-4729; Volume 4, pp. 3232-3237; In English; Automation, ICRA. Part 4 (of 4), Apr. 20-25, 1997, Albuquerque, NM, USA; Copyright; Avail: Issuing Activity

This paper deals with the problem of obtaining a rough estimate of three dimensional object position and orientation from a single two dimensional camera image. Such an estimate is required by most 3-D to 2-D registration and tracking methods that can efficiently refine an initial value by numerical optimization to precisely recover 3-D pose. However, the analytic computation of an initial pose guess requires the solution of an extremely complex correspondence problem that is due to the large number of topologically distinct aspects that arise when a three dimensional opaque object is imaged by a camera. Hence general analytic methods fail to achieve real-time performance and most tracking and registration systems are initialized interactively or by ad hoc heuristics. To overcome these limitations we present a novel method for approximate object pose estimation that is based on a neural net and that can easily be implemented in real-time. A modification of Kohonen's self-organizing feature map is systematically trained with computer generated object views such that it responds to a preprocessed image with one or more sets of object orientation parameters. The key idea proposed here is to choose network topology in accordance with the representation of 3-D orientation. Experimental results from both simulated and real images demonstrate that a pose estimate within the accuracy requirements can be found in more than 81% of all cases. The current implementation operates at 10 Hz on real world images. Author (EI)

Neural Nets; Real Time Operation; Computer Vision; Optimization; Heuristic Methods

19980009303

Modular neural-visual servoing using a neural-fuzzy decision network

Wu, Q. M. Jonathan, Natl. Research Council of Canada, Canada; Stanley, Kevin; Proceedings - IEEE International Conference on Robotics and Automation; 1997; ISSN 1050-4729; Volume 4, pp. 3238-3243; In English; Automation, ICRA. Part 4 (of 4), Apr. 20-25, 1997, Albuquerque, NM, USA; Copyright; Avail: Issuing Activity

Visual servoing is a growing research area. One of the key problems of feature based visual servoing is calculating the inverse Jacobian, relating change in features to change in robot position. Neural networks can learn to approximate the inverse feature Jacobian. However, the neural network approach can only approximate the feature Jacobian for a small workspace. In order to overcome this problem, we propose using a modular approach, where several networks are trained over a small area. Furthermore, we use a neural-fuzzy counterpropagation network to decide which subspace the robot is currently occupying. The neural fuzzy network provides smoother transitions between subspaces than hard switching. Preliminary results of the system's operation are also presented.
Author (EI)

Neural Nets; Computer Vision; Fuzzy Sets; Decision Theory; Approximation

19980009531 Oregon State Univ., Dept. of Botany and Plant Pathology, Corvallis, OR USA

Mechanisms of Viral Infection in Marine Brown Algae *Final Report, 1 Jan. - 31 Dec. 1996*

Meints, Russel H., Oregon State Univ., USA; Oct. 1997; 4p; In English
Contract(s)/Grant(s): N00014-93-I-0251
Report No.(s): AD-A330610; No Copyright; Avail: CASI; A01, Hardcopy; A01, Microfiche

Eukaryotic marine algal viruses are large, dsDNA viruses. Feldmannia species Virus (resolved in two genome size classes 158 and 178 kbp) was developed as our prototype stu dy systems. This virus infects marine brown algae. In nature sporophytic plants develop both plurilocular (mitotic) sporangia producing 2N spores and unilocular (meiotic) sporangia producing N spores. 2N spores normally yield adult sporophytes; haploid spores produce male and female gametophytes whose spores are the gametes for the sexual cycle. In the virus infected plant this life cycle is altered. Sporangia from virus-infected sporophytes do not produce spores. Instead unilocular sporangia contain virus particles. We show that the virus genomes exists in an integrated form within all other cells. All together the data suggest an integration/excision mechanism that employs an integrase/recombinase and conservative site-specific recombination. This enzyme complex appears to include topoisomerase-like activities which recognize sites within the virus and host. Unlike previously described systems we expect blunt end cutting and ligation or single bp. A large family of 173 bp repeat elements in the FsV genome was characterized. Two ORFs for 'RING' zinc finger bearing genes were found as were two protein kinase genes. Northern blots demonstrated 6 major and 18 minor transcripts. The most abundant transcript was the major structural protein. Sequence analysis indicated significant homology with proteins of Chlorella-virus, Iridioviruses and African Swine Virus.
DTIC
Africa; Algae; Chlorella; Cutting; Viral Diseases; Spores; Swine; Viruses

19980009763 Georgetown Univ., School of Medicine, Washington, DC USA
The Role of Interferon in the Cellular Response of the CNS Macrophage, the Microglia, During Injury and Inflammation ***Final Report, 1 Nov. 1993 - 31 Oct. 1996***
Colton, Carol A., Georgetown Univ., USA; Oct. 09, 1997; 6p; In English
Contract(s)/Grant(s): N00014-91-J-1123
Report No.(s): AD-A332085; No Copyright; Avail: CASI; A02, Hardcopy; A01, Microfiche
Our lab has studied the response of the CNS macrophage, the microglia to injury and inflammation. Using an in vitro approach, we have shown that microglia cultured from the cerebral cortices of neonatal animals (rat, mouse, hamster or human) have the same functional responses as non-CNS macrophages. That is, they demonstrate chemotaxis, express macrophage-like surface antigens and they produce a variety of cytoactive factors including proteases, interleukin-1 and reactive oxygen species (superoxide anion and nitric oxide). We found that both inflammatory and immune mediators (lipopolysaccharide and interferons, respectively) enhance the production of superoxide anion but do not directly activate the NADPH oxidase. These agents also increase Nitric Oxide (NO) production but in a very different time frame than that found for superoxide anion. Treatment of microglia with isopreterenol or dexamethazone depressed the microglial production of ROS. Our studies also demonstrated that human and hamster microglia do not produce NO in response to the same stimulating factors used in rat or mouse microglia. Hamster and human microglia did not produce NO except when treated with the double stranded polyribonucleotide, poly inosinic acid: poly cytidylic acid (Poly I:C). These findings have important consequences to the understanding of the response of humans to inflammation or injury.
DTIC
Injuries; Interferon; Cells (Biology); Wound Healing; Macrophages

19980009820 Stanford Univ., Dept. of Biological Sciences, Stanford, CA USA
Cellular Interactions in the Suprachiasmatic Nucleus ***Final Report, 1 May 1993 - 30 Apr. 1997***
vandenPol, Anthony, Stanford Univ., USA; Apr. 30, 1997; 6p; In English
Contract(s)/Grant(s): F49620-93-I-0283; AF Proj. 2312
Report No.(s): AD-A330024; AFOSR-TR-97-0510; No Copyright; Avail: CASI; A02, Hardcopy; A01, Microfiche
During the period (1993-1997) of support from AFOSR, we completed many papers. Some of those listed below deal exclusively with the subject of the proposal, the suprachiasmatic nucleus, and some deal indirectly with issues related to the circadian clock or transmitters found in the SCN. A substantial effort was invested in examining the two primary transmitters in the SCN, glutamate, which is excitatory, and GABA, which is inhibitory. These two are particularly important because the primary input from the retina that phase-shifts the clock is glutamate, and the primary transmitter made by SCN cells themselves is GABA.
DTIC
Circadian Rhythms; Glutamic Acid

19980009946 Portland State Univ., OR USA
Rapid Toxicity Assessment Using Micro-Eukaryotes ***Final Report, 1 Sep. 1995 - 30 Nov. 1996***
Pratt, James R., Portland State Univ., USA; Dec. 1996; 78p; In English
Contract(s)/Grant(s): DAMD17-95-I-5067

Report No.(s): AD-A332242; No Copyright; Avail: CASI; A05, Hardcopy; A01, Microfiche

This research evaluated growth of the soil ciliate Colpoda inflata (Stokes) in rapid toxicity tests by determining sensitivity to model compounds and differences in bioavailability of toxicants in different test media. Additional studies examined the bioassay in a field situation and examined another sublethal indicator (feeding rate) in rapid toxicity tests. Related studies evaluated rapid growth tests using the alga Haematococcus lacustris using methods similar to those used in the ciliate bioassay. C. inflata was more sensitive to toxicants in an inorganic medium than in media with high organic carbon content. C. inflata growth was more sensitive overall than other rapid-screening tests and many standard acute toxicity tests. Field tests showed that the rapid test could be applied to complex mixtures in the field. Feeding rate of C. inflata was significantly reduced by copper at levels comparable to the IG50 for ciliate growth. Rapid-screening tests of H lacustris showed less sensitivity than the ciliate bioassays. When ranked with other bioassays, H lacustris was the third most tolerant. Microeukaryotes that produce dormant life-stages such as cysts are ideal for use in rapid-screening bioassays. The organisms can be stored dormant, grown on demand, and be used in a 'battery of tests' applied to site and contaminant screening.

DTIC

SOIls; Sensitivity; Vitreous Materials; Toxicity; Bacteria

19980010001 Army Cold Regions Research and Engineering Lab., Hanover, NH USA

The Effects of Temperature on Germination of Eleven Festuca Cultivars

Palazzo, Antonio J., Army Cold Regions Research and Engineering Lab., USA; Brar, Gurdarshan S., Army Cold Regions Research and Engineering Lab., USA; Aug. 1997; 11p; In English

Report No.(s): AD-A330578; CRREL-SR-97-19; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

Many studies have shown that water potential at planting affects the germination rate and final germination of Festuca cultivars. Limited information is available about the extent of variability in temperature-dependence of germination among different Festuca cultivars. Our objective was to study germination at five temperatures for a wide range of Festuca cultivars. Festuca seeds were screened for germination during 28 days in polyethylene growth pouches held at constant temperatures of 10, 15, 20, 25, or 300 C. The germination percentage significantly (p less than 0.05) increased as the temperature increased from 10 to 150 C, when averaged across the cultivars, and decreased thereafter. The cultivar 'Clemfine' tall fescue (Festuca arundinacen Schreb.) had the greatest germination percentage, and 'Arctared' red fescue (Festuca rubra L.) had the least when averaged across the five temperatures. Conversely, the Average Time to Germination (ATG) was greatest at 100 C and least at 300 C. Reaching a germination level of 80% or more of the seeds required 14 days at 100 C, 9 d at 150 C, 8 d at 200 C, and 7 d at 25 or 300 C. Base temperatures required for germination of Festuca species were 3.20 C for rapid germinators, 3.6 to 60 C for medium germinators, and 4 to 60C for poor germinators. Heat units (growing degree-days greater than 100 C) calculated for the rapid germinators were 1290 C-d, 120 to 1400 C-d for medium germinators, and 135 to 1910 C-d for the poor germinators. Germination decreased as heat units were increased. The ATG and heat unit regressions explained.

DTIC

Temperature Effects; Germination; Farm Crops; Temperature Dependence

19980010277

CCD-based tissue imaging system

MacDonald, J. H., Inst. of Cancer Research, UK; Wells, K.; Reader, A. J.; Ott, R. J.; Nuclear Instruments "&" Methods in Physics Research, Section A: Accelerators, Spectrometers, Detectors and Associated Equipment; June 21, 1997; ISSN 0168-9002; Volume 392, no. 1-3, pp. 220-226; In English; 1996 4th International Conference on Position-Sensitive Detectors, Sep. 9-13, 1996, Manchester, UK; Copyright; Avail: Issuing Activity

A novel tissue imaging system has been developed utilising a cooled scientific grade charge coupled device (CCD) to detect the low energy X-ray emissions and beta particle emissions from a variety of isotopes commonly used in tissue autoradiography. Results are presented which illustrate the systems potential for faster and more accurate imaging of tissue samples than is conventionally achieved using film emulsion autoradiography. With position resolution approaching 20 $mu m and intrinsic sensitivity approaching 100%, the CCD system also surpasses the performance of current digital autoradiography technology. Because of the frame-by-frame composite way in which images are constructed, the system displays excellent linearity over a large dynamic range. Operation of the CCD in the inverted mode at temperatures up to 35 C has been investigated, with promising results.

Author (EI)

Charge Coupled Devices; Electron Counters; Imaging Techniques; X Rays; Electrons; Radiation Detectors

19980010292

Large area neutron and X-ray image-plate detectors for macromolecular biology

Cipriani, F., EMBL Outstation, France; Castagna, J. -C.; Claustre, L.; Wilkinson, C.; Lehmann, M. S.; Nuclear Instruments ”&” Methods in Physics Research, Section A: Accelerators, Spectrometers, Detectors and Associated Equipment; June 21, 1997; ISSN 0168-9002; Volume 392, no. 1-3, pp. 471-474; In English; 1996 4th International Conference on Position-Sensitive Detectors, Sep. 9-13, 1996, Manchester, UK; Copyright; Avail: Issuing Activity

To collect the thousands of reflections produced by large unit-cell biological samples, an on-line neutron image plate diffractometer has been developed at the EMBL Grenoble outstation and installed at the ILL. An off-line X-ray image-plate scanner based on the same design is being constructed for use on the ID14 beamline at ESRF.

Author (EI)

X Ray Detectors; Neutron Counters; X Ray Diffraction; Image Processing; Phosphors

19980010432 Rochester Univ., Dept. of Environmental Medicine, NY USA

Developmental Neurotoxicity of Methanol Exposure by Inhalation in Rats ***Topical Report, Jun. 1990 - Jun. 1994***

Weiss, B., Rochester Univ., USA; Stern, S., Rochester Univ., USA; Soderholm, S. C., Rutgers Univ., USA; Cox, C., Rutgers Univ., USA; Sharma, A., Rochester Univ., USA; Apr. 1996; 78p; In English

Report No.(s): PB96-189873; HEI-RR-96/73; Copyright Waived; Avail: CASI; A05, Hardcopy; A01, Microfiche

The possibility of widespread methanol exposure via inhalation stemming from its adoption as an automotive fuel or fuel component arouses concern about the potential vulnerability of the fetal brain. This project was designed to help address such concerns by studying the behavior of neonate and adult Long-Evans hooded rats following perinatal exposure to methanol vapor at 4,500 ppm for six hours daily beginning on gestation day 6 with both dams and pups then being exposed through postnatal day (PND) 21. Blood methanol concentrations of the dams, measured immediately following a six-hour exposure, were approximately 500 to 800 micrograms/milliliter. Average blood methanol concentrations in the pups were about twice those of the dams. Neurotoxicity was assessed by behavioral tests used previously to reveal adverse effects following developmental exposures to ethanol, cocaine, heavy metals, and other agents. Exposure of neonates to methanol did not affect suckling latency and attachment on PND 5, or performance on the conditioned olfactory aversion test on PND 10. Exposure to methanol did alter performances in the motor activity tests. Methanol-exposed neonates were less active on PND 18, but more active on PND 25 than the equivalent control-group pups. Schedule-controlled running in adults displayed a complex interaction with treatment. Changes in performance over the course of training differed between males and females depending on exposure to methanol. The results of the complex stochastic reinforcement schedule revealed behavioral differences due to methanol exposure in adults that were relatively subtle in nature and appeared after a new pattern of contingencies was introduced.

NTIS

Automobile Fuels; Toxicity; Air Pollution; Physiological Effects; Methyl Alcohol

19980010450 Colorado State Univ., Dept. of Anatomy and Neurobiology, Fort Collins, CO USA

Cellular Neurophysiology of the Rat Suprachiasmatic Nucleus: Electrical Properties, Neurotransmission, and Mechanisms of Synchronization ***Final Report, 1 Jul. 1993 - 30 Jun. 1997***

Dudek, F. E., Colorado State Univ., USA; Jun. 1997; 12p; In English

Contract(s)/Grant(s): F49620-93-I-0302; AF Proj. 2312

Report No.(s): AD-A329946; AFOSR-97-0464TR; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

Early experiments included sharp-intracellular-electrode analyses of amino-acid-mediated synaptic transmission and intrinsic membrane properties, designed in part to reveal the degree to which SCN neurons are homogenous or heterogenous. This work showed that glutamate and GABA play critical roles in synaptic transmission in the SCN, and that SCN neurons are not homogenous in terms of their electrophysiological properties, although they could not be grouped into distinct neuron classes. Multiple-unit extracellular recordings showed synchronous bursts of action potentials in the SCN in low Ca2(+) solutions containing amino-acid-receptor antagonists (demonstrated to block chemical synapses), thus suggesting that SCN neurons are capable of communicating through nonsynaptic mechanisms. Whole-cell patch-clamp data showed that SCN neurons have a novel delayed outward-rectifier K(+) current and a transient K(+) current (i.e., A-current), both of which are present in all SCN neurons. More recently, we have studied local synaptic circuits and GABA-mediated inhibition in the SCN. Using glutamate microapplication to selectively stimulate only SCN neurons, we have provided physiological evidence that SCN neurons are interconnected by inhibitory circuits.

DTIC

Amino Acids; Neurophysiology; Rats; Experimentation; Cells (Biology); Nervous System

19980010577 General Accounting Office, Washington, DC USA

Report to Congressional Committees. US Department of Agriculture: Information on the Condition of the National Plant Germplasm System

Oct. 1997; 92p; In English

Report No.(s): AD-A330524; GAO/RCED-98-20; No Copyright; Avail: CASI; A05, Hardcopy; A01, Microfiche

NPGS is primarily a federally and state-supported effort aimed at maintaining supplies of plant germplasm with diverse genetic traits for use in breeding and scientific research. The diversity in germplasm collections enables breeders to develop improved crops that are more productive and often less vulnerable to pests and diseases. These collections are particularly important because the diversity of germplasm worldwide has been reduced by several factors, such as the widespread use of genetically uniform crops in commercial agriculture and the destruction of natural habitats that have been important sources of germplasm. The Agricultural Marketing Act of 1946 established the main components of NPGS as well as a legal basis for federal and state cooperation in managing plant genetic resources. NPGS' current organizational structure-a geographically dispersed network of germplasm collections administered primarily by USDA'S Agricultural Research Service (ARS)-merged in the early 1970s. NPGS maintains about 440,000 germplasm samples for over 85 crops at 22 sites throughout the country and in Puerto Rico; almost half of these samples are maintained at four regional plant introduction stations. Germplasm samples are held in crop collections, each of which generally includes four types of germplasm (for example, germplasm from cultivated plants and germplasm from wild relatives of cultivated plants). Each type of germplasm contains genetic material that plays an important role in the collections' overall diversity.

DTIC

Agriculture; Breeding (Reproduction); Farm Crops; Genetics; Habitats

19980010580 National Inst. of Environmental Health Sciences, Research Triangle Park, NC USA

Toxicology and Carcinogenesis Studies of 1,2-Dihydro-2, 2,4-Trimethylquinoline (CAS No. 147-47-7) in F344/N Rats and B6C3F1 Mice (Dermal Studies) and the Initiation/Promotion (Dermal Study) in Female SENCAR Mice

Feb. 1997; 315p; In English

Report No.(s): PB98-101009; NTP-TR-456; NIH/PUB-97-3372; No Copyright; Avail: CASI; A14, Hardcopy; A03, Microfiche

A 1,2-Dihydro-2, 2,4-trimethylquinoline (monomer) is used as antioxidant instyrene-butadiene and nitrile-butadiene rubbers and latexes. It was nominated by the National Cancer Institute as part of a review of chemicals used in the manufacture and processing of rubber, during which potential occupational and consumer exposure to this compound can occur. It was selected for evaluation because it is a derivative of quinoline, a known rodent carcinogen, and was regarded as having potential carcinogenic activity. Because of the pattern of use and exposure, dermal administration was considered most appropriate.

NTIS

Toxicity; Monomers; Quinoline; Antioxidants; Carcinogens; Occupational Diseases; Rubber; Latex

19980010582 California Univ., San Diego, La Jolla, CA USA

Cholinesterase Structure: Identification of Residues and Domains Affecting Organophosphate Inhibition and Catalysis ***Annual Report, 6 Mar. 1996 - 5 Mar 1997***

Taylor, Palmer W., California Univ., San Diego, USA; Apr. 1997; 80p; In English

Contract(s)/Grant(s): DAMD17-95-1-5027

Report No.(s): AD-A329999; No Copyright; Avail: CASI; A05, Hardcopy; A01, Microfiche

In the second year of the grant, we have made excellent progress in several arenas: (1) The crystal structure of a mouse acetylcholinesterase-fasciculin 2 complex has provided an essential template for structure-function studies; (2) Studies with a series of enantiomeric organophosphates have been completed; they have yielded vital information on their binding orientation in the ground and transition states. Residues governing enantiomer specificity and leaving group orientation have been defined; (3) Studies in oxime reactivation of cholinesterase inhibited by the enantiomeric phosphates show two faces of attack between the oxime and the conjugated phosphonate; (4) The interactions of fasciculin 2 with acetylcholinesterase have been studied by kinetic and site-specific mutagenesis methods. The fasciculin2-acetylcholinesterase complex has enabled us to study entry of ligands to the active center gorge.

DTIC

Acetyl Compounds; Cholinesterase; Crystal Structure; Organic Phosphorus Compounds; Phosphates; Catalysis

19980010606 Boston Univ., Boston, MA USA

Antifreeze Polypeptides as Biomineralization Models ***Final Report, 15 Aug. 1994 - 14 Aug. 1997***

Laursen, Richard A., Boston Univ., USA; Oct. 25, 1997; 6p; In English

Contract(s)/Grant(s): DAAH04-94-G-0308
Report No.(s): AD-A332083; ARO-32.914.6-LS; No Copyright; Avail: CASI; A02, Hardcopy; A01, Microfiche

During the past three years we have focused on three specific aims: (1) understanding the mechanism of ice-binding by antifreeze polypeptides (AFPs), (2) synthesis and characterization of peptides (CBPs) that alter the morphology of a mineral, calcite, and (3) characterizing the interaction between a specific CBP and calcite. In the course of pursuing aim (1), we discovered, in the longhorn sculpin, a new class (type W) of antifreeze protein and have determined completely both its protein and DNA sequences. It con tains 108 amino acids and, we believe, based on secondary structure analysis, folds into a 4-helix bundle. We have designed and synthesized an alpha-helical peptide designed 'de novo' to bind to the prism face of calcite. This peptide has a remarkable effect on calcite crystal morphology: at low temperatures, in its helical form, it does appear to bind to a prism face, but when the peptide is unfolded, it causes epitaxial growth off the rhombohedral surfaces of calcite seed crystals, resulting in very unusual morphology. This is perhaps the first example of a rationally designed, morphology controlling mineral binding peptide. We have also synthesized a helical phosphopeptide which appears to bind to the basal face of calcite.
DTIC
Calcification; Calcite; Crystals; Deoxyribonucleic Acid; Low Temperature; Minerals; Morphology; Peptides; Polypeptides

19980010775 Purdue Univ., Mechanical Engineering Technology, West Lafayette, IN USA
Brinelling the Malay Snail
Windener, Edward L., Purdue Univ., USA; Ismail, Hasni B., Tun Hussein Onn Inst., Malaysia; Standard Experiments in Engineering Materials Science and Technology; Jul. 1997, pp. 431-435; In English; Also announced as 19980010742; No Copyright; Avail: CASI; A01, Hardcopy; A04, Microfiche

Lab facilities for metals testing were under construction at the Polytechnic Staff Training Center (PSTC) when classes began. Equipment was not yet commissioned, and supplies not yet available, to test impact-toughness by ASTM E 23 method. Simple demonstrations such as swinging a pendulum (string and ball) or dropping a weight (nut or bolt) to crack a hard-boiled egg are messy or costly. Also, hens eggs have simple shape and uniform size. So, we dropped steel balls (Brinell indentor) through vertical tubes, onto empty snail shells. The common 'Lymnaea' land-snail was readily found, sun-dried and rain-washed. This practical exercise in technical problem-solving included: Measuring specimens of similar shape (variable size); Selecting target area; Holding tapered specimens; Designing a telescoping tube; Having adequate ball-to-tube clearance; Determining a failure criterion; Calculating potential energy to puncture; Plotting data (dimensionless parameters). The co-author was an undergraduate student, who subsequently ran numerous tests and measured dozens of samples. This was his senior project (capstone experience) in Mechanical Engineering in Malaysia.
Derived from text
Mechanical Engineering; Problem Solving; Steels

19980010781 Loyola Coll., Dept. of Electrical Engineering and Engineering Science, Baltimore, MD USA
In-Vivo Testing of Biomaterials
South, Joe, Loyola Coll., USA; Keilson, Suzanne, Loyola Coll., USA; Keefer, Don, Loyola Coll., USA; Standard Experiments in Engineering Materials Science and Technology; Jul. 1997, pp. 497-511; In English; Also announced as 19980010742; No Copyright; Avail: CASI; A03, Hardcopy; A04, Microfiche

The objective of this work is to study issues of biocompatibility and methods of biological testing of materials (implantation), as well as learning techniques and equipment for SEM use and hardness testing. This study can be used as an ongoing lab for learning techniques and issues related to biocompatibility and in-vivo testing. The particular objective was to determine the effects of in-vivo testing upon the diamond pyramid (Vickers) hardness of the material. This is an example of one of many materials' parameters for determining overall biocompatibility of a material. Biocompatibility of materials is an important and growing area of materials science research. Many materials' parameters affect the overall usefulness of a material for long term implantation in the human body. It is important to understand the environment in which the material is meant to reside. Will it be weight bearing; what forces and stresses will it be subject to; how long will it be in place; what is the chemical environment to which it is subject (e.g. pH)? All implanted materials will elicit a response from the tissues at their interface. The most demanding situations are those that require both functional and structural support. The challenge is to minimize the compromises in form, function, biochemistry, and biomechanics. In this experiment, Bioglass(registered mark) was implanted into laboratory rats for in-vivo testing. The purpose was to survey the effects, if any, of heat treatment, duration of implantation, and composition type of Bioglass(registered mark), on the hardness of samples.
Derived from text
Biocompatibility; Implantation; Heat Treatment

19980010911 State Univ. of New York, Stony Brook, NY USA

Formation of Calcite Biocrystals; Structure and Formation of Matrix Glycoproteins ***Final Report, 1 Mar. 1993 - 28 Feb. 1997***

Lennarz, William J., State Univ. of New York, USA; Feb. 28, 1997; 3p; In English

Contract(s)/Grant(s): N0004-93-I-0229

Report No.(s): AD-A331408; No Copyright; Avail: CASI; A01, Hardcopy; A01, Microfiche

The presence of proteins associated with the CaCO3-containing biocrystals found in a wide variety of marine organisms is well established. In these organisms, including the primitive skeleton (spicule) of the sea urchin embryo, the structural and functional role of these proteins either in the biomineralization process or in control of the structural features of the biocrystals is unclear. Recently, one of the matrix proteins of the sea urchin spicule, SM3O, has been shown to contain a carbohydrate chain (the 1223 epitope) that has been implicated in the process whereby Ca2+ is deposited as CaCO3. Because an understanding of the localization of this protein, as well as other proteins found within the spicule, is central to understanding their function, we undertook to develop metho ds to localize spicule matrix proteins in intact spicules, using immunogold techniques and scanning electron microscopy. Gold particles indicative of this matrix glycoprotein could not be detected on the surface of spicules that had been isolated from embryo homogenates and treated with alkaline hypochlorite to remove any associated membranous material. However, when isolated spicules were etched for 2 min with dilute acetic acid (10 mM) to expose more internal regions of the crystal, SM3O and perhaps other proteins bearing the 1223 carbohydrate epitope were detected in the calcite matrix. These results, indicating that these two antigens are widely distributed in the spicule, suggest that this technique should be applicable to any matrix protein for which antibodies are available.

DTIC

Acetic Acid; Antibodies; Antigens; Carbohydrates; Marine Biology; Musculoskeletal System; Organisms; Position (Location); Proteins

19980011508 Environmental Protection Agency, Ada, OK USA

Chlorobenzene Bioreactor Demonstration ***Final Report, Mar. - Nov. 1992***

Miller, Dennis, Environmental Protection Agency, USA; Spain, Jim, Environmental Protection Agency, USA; Wallace, William, Environmental Protection Agency, USA; Vogel, Catherine, Environmental Protection Agency, USA; Mar. 1997; 63p; In English

Contract(s)/Grant(s): MIPR-N92-16

Report No.(s): AD-A332757; EPA-RW57935105-01-1; AL/EQ-1993-0008; No Copyright; Avail: CASI; A04, Hardcopy; A01, Microfiche

The technical objective of this research was to test whether above-ground, fixed-film bioreactors can biodegrade complex mixtures of chlorinated aromatic compounds in groundwater. Specifically, the project was designed to test the metabolic capabilities of Pseudomonas Strain JS150 in the field. The approach involved a preliminary field study at Robins AFB GA using two above-ground, fixed-film bioreactors, one colonized with Pseudomonas JS150 and one colonized with indigenous groundwater bacteria, to measure degradation of chlorinated aromatic compounds. Independent variables measured included temperature, pH, dissolved oxygen, and fluctuations in microbial populations. Results from the bench-scale column study indicated that the JS150 isolate had the greatest number of desirable qualities and would be the best selection to utilize in a biofilm reactor. Results from the study indicate that both reactors provided substantial chlorobenzene removal (greater than 95%). Data indicate that bioreactor inoculation may be useful for reducing startup time. No degradation intermediates were detected from either the inoculated or uninoculated reactors.

DTIC

Bioreactors; Inoculation; Chlorination; Ground Water; Bacteria; Strain Distribution; Scale Models

19980011547 NASA Ames Research Center, Moffett Field, CA USA

An Evaluation of the Frequency and Severity of Motion Sickness Incidences in Personnel Within the Command and Control Vehicle (C2V)

Cowings, Patricia S., NASA Ames Research Center, USA; Toscano, William B., NASA Ames Research Center, USA; DeRoshia, Charles, NASA Ames Research Center, USA; Jan. 1998; 28p; In English

Contract(s)/Grant(s): RTOP 199-14-12; IA-BLI-88

Report No.(s): NASA/TM-98-112221; NAS 1.15:112221; A-98-09480; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

The purpose of this study was to assess the frequency and severity of motion sickness in personnel during a field exercise in the Command and Control Vehicle (C2V). This vehicle contains four workstations where military personnel are expected to perform command decisions in the field during combat conditions. Eight active duty military men (U.S. Army) at the Yuma Prov-

ing Grounds in Arizona participated in this study. All subjects were given baseline performance tests while their physiological responses were monitored on the first day. On the second day of their participation, subjects rode in the C2V while their physiological responses and performance measures were recorded. Self-reports of motion sickness were also recorded. Results showed that only one subject experienced two incidences of emesis. However, seven out of the eight subjects reported other motion sickness symptoms; most predominant was the report of drowsiness, which occurred a total of 19 times. Changes in physiological responses were observed relative to motion sickness symptoms reported and the different environmental conditions (i.e., level, hills, gravel) during the field exercise. Performance data showed an overall decrement during the C2V exercise. These findings suggest that malaise and severe drowsiness can potentially impact the operational efficiency of the C2V crew. It was concluded that conflicting sensory information from the subject's visual displays and movements of the vehicle during the field exercise significantly contributed to motion sickness symptoms. It was recommended that a second study be conducted to further evaluate the impact of seat position or orientation and C2V experience on motion sickness susceptibility. Further, it was recommended that an investigation be performed on behavioral methods for improving crew alertness, motivation, and performance and for reducing malaise. Author

Human Performance; Motion Sickness; Physiological Responses; Physiological Tests; Psychophysiology

19980011620 Tennessee Univ., Medical Center, Knoxville, TN USA

Spaceflight Associated Apoptosis ***Final Report***

Ichiki, Albert T., Tennessee Univ., USA; Gibson, Linda A., Tennessee Univ., USA; Allebban, Zuhair, Tennessee Univ., USA; 1996; 28p; In English

Contract(s)/Grant(s): NAG2-494

Report No.(s): NASA/CR-96-206706; NAS 1.26:206706; Rept-96-I-15V; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

Lymphoid tissues have been shown to atrophy in rats flown on Russian spaceflights. Histological examination indicated evidence for cell degradation. Lymphoid tissues from rats flown on Spacelab Life Sciences-2 mission were analyzed for apoptosis by evidence of fragmented lymphocytes, which could be engulfed by macrophages, or DNA strand breaks using the terminal deoxynucleotidyl transferase-mediated dUTP nick end-labeling (TUNEL) assay. Apoptosis was not detected in the thymus and spleen collected inflight or from the synchronous ground rats but was detected in the thymus, spleen and inguinal lymph node of the flight animals on recovery. These results indicate that the apoptosis observed in the lymphatic tissues of the rats on recovery could have been induced by the gravitational stress of reentry, corroborating the findings from the early space-flight observations. Author

Space Flight; Cells (Biology); Gravitational Effects; Lymph; Deoxyribonucleic Acid; Biological Effects; Tissues (Biology)

19980011639 Virginia Polytechnic Inst. and State Univ., Blacksburg, VA USA

Basic Research Effort Toward Development of a Vaccine Against Human Brucellosis; Identification of Protective Brucella Antigens and Their Expression in Vaccinia Virus to Prevent Disease in Animals and Humans ***Annual Report, 1 May 1996 - 30 Apr. 1997***

Schurig, Gerhardt G., Virginia Polytechnic Inst. and State Univ., USA; Sep. 1997; 22p; In English

Contract(s)/Grant(s): DAMD17-94-C-4042

Report No.(s): AD-A332973; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

This project intends to identify Brucella antigens which are likely to stimulate Th1 responses (with production of lNF-gamma) with lymphocytes from vaccinated mice and therefore, are likely to have a role in the induction of protective immunity against brucellosis. Once such antigens have been identified, the genes encoding those antigens will be isolated, sequenced and their products will be characterized. Using these genes, recombinant vaccinia viruses will be constructed. DTIC

Vaccines; Antigens; Viral Diseases; Research

19980011795

Spherical aberration of the reduced schematic eye with elliptical refracting surface

Thibos, Larry N., Indiana Univ., USA; Ye, Ming; Zhang, Xiaoxiao; Bradley, Arthur; Optometry and Vision Science; July, 1997; ISSN 1040-5488; Volume 74, no. 7, pp. 548-556; In English; Copyright; Avail: Issuing Activity

We extend the single-surface schematic-eye model of ocular chromatic aberration to account for spherical aberration of the eye. This extension is accomplished by allowing the model's single refracting surface to be a member of the family of ellipses with variable shape parameter (eccentricity). The resulting model, dubbed the 'Indiana Eye,' may have either positive or negative spherical aberration of varying degree, depending upon the numerical value of the shape parameter. Spherical aberration of the

model eye is well described by third-order optical theory for shape parameters in the range 0 less than or = p less than or = 0.7, but requires fifth-order theory for an accurate description over the parametric range 0.7 less 1.0. An improved technique was devised for fitting the model to published measurements of ray aberrations while avoiding errors of estimation of the degree of spherical aberration present in eyes which also manifest odd-symmetric aberrations, such as coma. A shape parameter value of approximately p = 0.6 provided the best fit of the model to selected data from the literature.
Author (EI)
Eye (Anatomy); Vision; Aberration; Light (Visible Radiation); Refraction; Mathematical Models

19980011798
Use of liquid-crystal adaptive-optics to alter the refractive state of the eye
Thibos, Larry N., Indiana Univ., USA; Bradley, Arthur; Optometry and Vision Science; July, 1997; ISSN 1040-5488; Volume 74, no. 7, pp. 581-587; In English; Copyright; Avail: Issuing Activity

We evaluated the potential of wavefront shaping with liquid-crystals for modulating the eye's refractive state. A spatial light modulator with 127 liquid crystal cells was imaged in the entrance pupil of the eye and programmed to induce prismatic, spherical, and astigmatic refractive changes. Psychophysical evaluation of these optical effects was in agreement with expectations for prisms up to approximately 0.08 D and for lenses up to approximately 1.5 D. These maximum dioptric values represent wavefront retardation of about 3 to 4 wavelengths of 584 nm light across a 3-mm diameter pupil. Optical aliasing of high-power prisms was traced to spatial undersampling of the wavefront retardation function by the discrete array of liquid crystal cells. Undersampling may also be the factor which limits the useful dioptric range of the technique.
Author (EI)
Adaptive Optics; Eye (Anatomy); Liquid Crystals; Wave Fronts; Vision; Light (Visible Radiation); Refraction; Light Modulation

19980011975 Purdue Univ., Agricultural and Biological Engineering Dept., West Lafayette, IN USA
Physiological Response of Plants Grown on Porous Ceramic Tubes ***Final Report***
Tsao, David, Purdue Univ., USA; Okos, Martin, Purdue Univ., USA; Jul. 1997; 374p; In English
Contract(s)/Grant(s): NAG10-112
Report No.(s): NASA/CR-97-206741; NAS 1.26:206741; No Copyright; Avail: CASI; A16, Hardcopy; A03, Microfiche

This research involves the manipulation of the root-zone water potential for the purposes of discriminating the rate limiting step in the inorganic nutrient uptake mechanism utilized by higher plants. This reaction sequence includes the pathways controlled by the root-zone conditions such as water tension and gradient concentrations. Furthermore, plant based control mechanisms dictated by various protein productions are differentiated as well. For the nutrients limited by the environmental availability, the kinetics were modeled using convection and diffusion equations. Alternatively, for the nutrients dependent upon enzyme manipulations, the uptakes are modeled using Michaelis-Menten kinetics. In order to differentiate between these various mechanistic steps, an experimental apparatus known as the Porous Ceramic Tube - Nutrient Delivery System (PCT-NDS) was used. Manipulation of the applied suction pressure circulating a nutrient solution through this system imposes a change in the matric component of the water potential. This compensates for the different osmotic components of water potential dictated by nutrient concentration. By maintaining this control over the root-zone conditions, the rate limiting steps in the uptake of the essential nutrients into tomato plants (Lycopersicon esculentum cv. Cherry Elite) were differentiated. Results showed that the uptake of some nutrients were mass transfer limited while others were limited by the enzyme kinetics. Each of these were adequately modeled with calculations and discussions of the parameter estimations provided.
Author
Physiological Responses; Plants (Botany); Porous Materials; Mathematical Models; Reaction Kinetics; Ceramics

52
AEROSPACE MEDICINE

Includes physiological factors; biological effects of radiation; and effects of weightlessness on man and animals.

19980009140 Royal Inst. of Tech., Dept. of Mathematics, Stockholm, Sweden
Time to Extinction in Recurrent Epidemics
Nasell, I., Royal Inst. of Tech., Sweden; Jun. 06, 1997; 37p; In English
Report No.(s): PB97-208995; TRITA-MA-97-MA-22; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

A new approximation is derived for the expected time to extinction in a stochastic model for recurrent epidemics. Numerical illustrations indicate that the approximation has correct order of magnitude, but that improvements are required. The quasi-station-

ary distribution plays an important role in the derivation. Approximations of the critical community size and of the persistence threshold are derived. Comments are made on the classical study by Bartlett (1956-1960).
NTIS
Epidemiology; Mathematical Models; Stochastic Processes; Communities

19980009275 Defence Science and Technology Organisation, Defence Food Science Centre, Canberra, Australia
Review of Methods of Improving the Intake and Absorption of Water into the Body by the Use of Alternative Supply Methods and/or Additives
Thomson, G. F., Defence Science and Technology Organisation, Australia; Walker, G. J., Defence Science and Technology Organisation, Australia; Forbes-Ewan, C. H., Defence Science and Technology Organisation, Australia; May 1997; 32p; In English
Report No.(s): AD-A329907; DSTO-TR-0483; DODA-AR-010-119; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

Defence personnel working in the heat run the risk of heat illnesses and decreased performance due to hypohydration. Physiological, psychological and mechanical methods for improving the intake and absorption of water into the body are discussed. Recommendations include evaluation of the effectiveness and service suitability of
DTIC
Heat Tolerance; Psychological Effects; Water; Heat Stroke; Dehydration; Risk

19980009506 Consiglio Nazionale delle Ricerche, Ist. di Analisi dei Sistemi ed Informatica, Rome, Italy
Binding of L-Tryptophan to Human Serum Albumin and Competition with Indole-3-Acetic Acid
Gandolfi, A., Consiglio Nazionale delle Ricerche, Italy; Mingrone, G., Consiglio Nazionale delle Ricerche, Italy; Bertuzzi, A., Consiglio Nazionale delle Ricerche, Italy; Greco, A. V., Consiglio Nazionale delle Ricerche, Italy; Vanholder, R., Consiglio Nazionale delle Ricerche, Italy; May 1994; 19p; In English
Report No.(s): PB96-152517; Copyright Waived (NASA); Avail: Issuing Activity (Natl Technical Information Service (NTIS)), Microfiche

The level of free tryptophan and its metabolites in serum appears to be related to some pathologic states, such as chronic renal failure and neuropsychiatric disorders, so that a precise characterization of tryptophan binding to serum albumin is of interest. In the paper, the binding of L-tryptophan to defatted human serum albumin at 37 degrees C and pH 5, 7.4, and 8.5 was studied by means of equilibrium dialysis. In addition, the competition between L-tryptophan and indole-3-acetic acid was investigated at pH 7.4, as well as the binding of L-tryptophan in human serum. We found for the binding to defatted albumin one site with association constant 1.04 x 10(exp 4) M(exp -1) at pH 7.4, and 0.52 sites per albumin molecule with association constant 10.59 x 10(exp 4) M(exp -1) at pH 8.5. Negligible binding was found at pH 5. The competition experiment suggested that one specific site on albumin is common for L-tryptophan and indole-3-acetic acid, but the data were not adequately predicted by a purely competitive scheme.
NTIS
Acetic Acid; Tryptophan; Serums; Albumins

19980009537 Consiglio Nazionale delle Ricerche, Ist. di Analisi dei Sistemi ed Informatica, Rome, Italy
Binding of Indole-3-Acetic Acid to Human Serum Albumin
Bertuzzi, A., Consiglio Nazionale delle Ricerche, Italy; Mingrone, G., Consiglio Nazionale delle Ricerche, Italy; Gandolfi, A., Consiglio Nazionale delle Ricerche, Italy; Greco, A. V., Consiglio Nazionale delle Ricerche, Italy; Ringoir, S., Consiglio Nazionale delle Ricerche, Italy; May 1994; 19p; In English
Report No.(s): PB96-152509; Copyright Waived (NASA); Avail: Issuing Activity (Natl Technical Information Service (NTIS)), Microfiche

Indole-3-acetic acid, a product of tryptophan metabolism, is commonly considered to be a uremic toxin. Protein binding may affect the free concentration and hence the toxicity of this compound. In the present paper, the binding of indole-3-acetic acid to defatted human serum albumin at 37 degrees C and pH 5, 7.4, and 8.5 was studied by equilibrium dialysis. The binding of indole-3-acetic acid in human serum was also investigated. Binding to defatted albumin was analyzed by a mathematical model assuming two independent high affinity binding sites plus a class of low affinity sites. For the site with highest affinity we found the following association constants: 6.80 x 10(exp 3) M(exp -1) at pH 5, 8.96 x 10(exp 3) M(exp -1) at pH 7.4, and 5.25 x 10(exp

3) M(exp -1) at pH 8.5. In addition, a large number of low affinity sites was evidenced. The pH dependence of the highest affinity constant was investigated by a theoretical model.
NTIS
Serums; Acetic Acid; Albumins; Indoles; Mathematical Models

19980009630 Georgetown Univ., Washington, DC USA
Phase I Evaluation of Desbutyihalofantrine in Healthy Volunteers ***Annual Report, 15 Sep. 1996 - 14 Sep 1997***
Abernethy, Darrell R., Georgetown Univ., USA; Sep. 1997; 105p; In English
Contract(s)/Grant(s): DAMD17-96-C-6102
Report No.(s): AD-A332082; No Copyright; Avail: CASI; A06, Hardcopy; A02, Microfiche

The study design was a randomized, double-blind, placebo-controlled Phase 1 safety and tolerance study. Twenty-one healthy volunteers were randomly assigned to receive halofantrine or placebo. Initially it was planned to study 16 subjects, with 12 subjects to receive active drug (halofantrine) and 4 subjects to receive placebo, however due to subject dropouts prior to study completion, the number to be enrolled was increased to increase the number of subjects who completed the entire study. The blind was maintained with the increase in sample size accomplished by stratified randomization. Subjects were dosed daily for 42 days with 500 mg halofantrine hydrochloride. Subjects fasted for at least 2 hours prior to and 2 hours following the oral dose. The initial 21 days of drug administration were done with subjects confined as inpatients to the the Georgetown University Medical Center Clinical Research Center and the remaining 21 days of drug administration the subject reported daily to the Clinical Research Center for medical assessment and supervised drug administration. The subjects were then followed periodically for the next 4 1/2 months with medical assessments and pharmacokinetic sampling at the Clinical Research Center.
DTIC
Physiological Effects; Medical Science; Sampling; Physiological Tests

19980009784 Technische Univ., Eindhoven, Netherlands
Validation of the Quadriphasic Mixture Theory for Intervertebral Disc Tissue
Frijns, A. J. H., Technische Univ., Netherlands; Huyge, J. M., Technische Univ., Netherlands; Janssen, J. D., Technische Univ., Netherlands; Nov. 1996; 21p; In English; Figures in this document may not be legible in mic
Report No.(s): PB97-204937; RANA-96-22; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

The selling and shrinking behavior of soft biological tissues is describes by a quadriphasic mixture model. In this model four phases are distinguished: a charged solid, a fluid, cations and anions. A description of the set of coupled differential equations of this quadriphasic mixture model is given. These equations are solved by the finite element method using a weighted residual approach. The resulting non-linear integral equations are linearized and solved by the Newton-Raphson iteration procedures. We performed some confined swelling and compression experiments on intervertebral disc tissue. These experiments are simulated by a one-dimensional finite element implementation of this quadriphasic mixture model.
NTIS
Differential Equations; Integral Equations; Newton-Raphson Method; Finite Element Method; Spine; Swelling

19980009880 Geo-Centers, Inc., Newton, MA USA
Research on Navy-Related Combat Casualty Care Issues, Navy Operational-Related Injuries and Illnesses and Approaches to Enhance Navy/Marine Corps Personnel Combat Performance ***Quarterly Report, 1 Jun. - 31 Aug. 1997***
Oct. 06, 1997; 100p; In English
Contract(s)/Grant(s): N00014-95-D-0048
Report No.(s): AD-A330584; GC-PR-2728-003; No Copyright; Avail: CASI; A05, Hardcopy; A02, Microfiche

This report summarizes the results of GEO-CENTERS' technical activities for the first option year one of the Naval Medical Research Institute (NMRI) Contract N00014-95-D-0048, Delivery Orders 002, 003 and 004. The delivery orders encompass a variety of scientific studies that are capable of supporting ongoing and projected programs under the cognizance of NMRI; NMRI TOX/DET-Dayton, OH; NMRI/DET-San Antonio, TX; NDRI-Great Lakes, IL; the NDRI Detachment-Bethesda, MD; the National Naval Medical Center-Bethesda, MD; and the U.S. Navy Clothing and Textile Facility-Natick, MA. The format for these periodic technical progress reports consists of four sections each listed by the location of the research. The sections are: (1) Descriptions of work to be performed; (2) Objectives planned for the current reporting period; (3) Summary of work performed during current reporting period; and (4) Objectives for the next reporting period. Accumulated scientific reports, technical reports and journal articles are being provided as part of this quarterly technical progress report. Specifically, the research conducted by GEO-CENTERS during this quarterly reporting period has been focused on the following general scientific programs: (1) Infectious disease threat assessment and preventive medicine programs; (2) Immune cell biology, wound repair and artificial blood

studies; (3) Biomedical diving programs; (4) Personnel performance enhancement programs; (5) Breast Care Center; (6) Directed Energy Effects Research; (7) Dental related diseases; (8) Toxicological studies; and (9) Human Performance and U.S. Navy Clothing Development.
DTIC
Injuries; Military Technology; Medical Services; Wound Healing; Prevention; Casualties

19980009947 Naval Postgraduate School, Monterey, CA USA
Analysis of The Medical Augmentation Program
Boufford, John R., Naval Postgraduate School, USA; Mar. 1997; 72p; In English
Report No.(s): AD-A332238; No Copyright; Avail: CASI; A04, Hardcopy; A01, Microfiche
This thesis reviews medical readiness in the U. S. Navy. Data from multiple sources were used to analyze medical readiness issues. Analysis shows that Navy medical readiness needs to improve. Recommendations address the formulation of a readiness organization within the Military Treatment Facility (MTF). This organization would utilize the existing MTF organization and provide continuity, command involvement, and a means for continuous improvement.
DTIC
Augmentation; Modulation Transfer Function; Navy; Medical Services

19980009989 Johns Hopkins Univ., Baltimore, MD USA
Structural Indices of Stress Fracture Susceptibility in Female Military Recruits ***Annual Report, 22 Sep. 1996 - 21 Sep. 1997***
Beck, Thomas J., Johns Hopkins Univ., USA; Oct. 1997; 12p; In English
Contract(s)/Grant(s): DAMD17-95-2-5027
Report No.(s): AD-A332132; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche
A study was undertaken to examine stress fracture susceptibility in female US Marine Corps recruits, using anthropometry and bone structural measurements derived from dual energy x-ray absorptiometry (DEXA) scans of the femur and lower leg. A total of 671 recruits received anthropometry and DEXA scans at the onset of training and were followed to ascertain stress fractures. A total of 36 recruits (5.2%) suffered stress fractures; 13 cases were in the foot, 10 each in the pelvic girdle and lower leg, and 9 in the femur. Fracture cases were pooled and compared with non-fracture cases. Results show that BMD, cross-sectional geometry, strength indices, and mean cortical thicknesses of the femur and tibia were significantly lower in cases than in controls, suggesting relatively weaker bone strength of the lower limbs of fracture cases, a result also seen earlier in males. In the male however, small body size predisposed to stress fracture, but in the generally smaller female, body size was unimportant. Moreover male stress fractures were predominantly below the knee (81%), while more than half (53%) of female cases were in the femur or pelvic girdle. When pelvic stress fractures were separately compared to controls, only pelvic and intertrochanteric breadths corrected for body weight, were significantly larger in cases. This suggests that a relatively wide pelvis is a risk factor for pelvic stress fracture and considering the narrow male pelvis may explain why pelvic stress fractures is a female phenomenon.
DTIC
Fracturing; Femur; Leg (Anatomy)

19980009998 Pennsylvania Univ., Dept. of Psychiatry, Philadelphia, PA USA
A Genetic Approach to Mammalian Circadian Rhythms ***Final Report, 1 May 1994 - 30 Apr. 1997***
Bucan, Maja, Pennsylvania Univ., USA; Jan. 1995; 6p; In English
Contract(s)/Grant(s): F49620-94-I-0234; AF Proj. 2312
Report No.(s): AD-A330711; AFOSR-TR-97-0525; No Copyright; Avail: CASI; A02, Hardcopy; A01, Microfiche
We have developed a routine procedure for random mutagenesis in the mouse and have demonstrated the feasibility of rapidly screening for aberrant behavioral parameters. We believe that this classical genetic approach, as well as the screening of progeny of mutagenized mice for altered sequence and/or expression pattern prior to phenotypic analysis, will play an important role in the elucidation of the functional content of the mammalian genome.
DTIC
Aberration; Abnormalities; Circadian Rhythms; Genetics

19980010019 Armstrong Lab., Wright-Patterson AFB, OH USA
The Effect of Menstrual Phase and Oral Contraceptives on Female Adaptation and Performance at High G ***Final Report, 22 Dec. 1995 - 31 Mar. 1997***
Chelette, Tamara, Armstrong Lab., USA; Mar. 1997; 38p; In English
Contract(s)/Grant(s): MIPR-96MM6647

Report No.(s): AD-A330011; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

Females are now flying combat aircraft in the Air Force. Questions of gender differences regarding adaptation and performance in the high-G environment (9G) must be studied scientifically. The Dynamic Environment Simulator, a three-axis centrifuge with closed-loop flight simulation, provides the laboratory to investigate these issues. The eight women in this high-G performance study did not show cardiovascular adaptation to high-G, whereas the eight men d id. Both genders showed increased leg calf compliance indicating possible chronic vascular effects. No echocardiographic evidence of heart damage was found. The women demonstrated half the strength of the men, but displayed similar G tolerance and endurance. The women showed less oxygen desaturation of brain tissue than the men during high-G exposure. The women did not perform the simulated air-to-air combat sortie quite as well as the men, though there was no effect of menstrual cycle on their ability to complete the mission. There was also no effect of high-G exposure on the length of the female monthly cycle, regardless of oral contraceptive use. Women demonstrated acceptable tolerance to and performance during simulated high-G aerial combat, without menstrual effect, even in light of their reduced muscular strength and cardiovascular adaptation as compared to men.

DTIC

Gravitational Effects; Feedback Control; Flight Simulation; Females; Fighter Aircraft; Muscular Strength; Oxygen; Echocardiography; Desaturation

19980010027 Iowa Univ., Iowa City, IA USA

Use of Biomarkers to Optimize Heat Acclimation in Women ***Annual Report, 25 Sep. 1996 - 24 Sep. 1997***

Gisolfi, Carl V., Iowa Univ., USA; Oct. 1997; 20p; In English

Contract(s)/Grant(s): DAMD17-95-C-5093

Report No.(s): AD-A332062; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

The effects of estrogen supplementation (ES) on heat acclimation was studied in 14 premenopausal females (18-35 yrs old) randomly assigned to either ES or placebo (P) groups after being matched for VO2 max, percent body fat, and body weight/surface area ratio. Four days after the onset of menstruation they performed 2-h bouts of treadmill exercise (35-45% VO2 max) daily in the heat (450 C, 20% RH) until acclimated. On day 2 of the menstrual cycle, subjects ingested either 13-estradiol tablets (6 mg/day) or placebo tablets, for 7 d. Based on thermal and circulatory measures, 11SP70 synthesis, and days to achieve acclimation, we conclude that ES, as performed in this study, had no effect on heat acclimation. In the animal study, rats received daily subcutaneous injections of estradiol (10 ug/100 ml/g b.w.). One group underwent a daily exertional heating protocol (trained) and a second group served as sham controls (untrained). Within each group, 3 subgroups were utilized to assess the time course of potential alterations: (a) 4-day, (b) 8-day, or (c) 12-day. On the final day of a protocol, rats underwent a heat tolerance test consisting of treadmill exercise at 21.5 m/min at 350C until colonic temperature (Tc) reached 40.40 C. In general, rats in the trained group had lower body weights, reduced resting Tc'S, attenuated heating rates, and increased run times to 40.40 C (P less than 0.05) than their untrained counterparts. These results were primarily manifested in rats trained for 8 or 12 days compared with the 4-day treatment group. These studies demonstrate that the combination of exertional heat exposure and estradiol treatment, when compared to estradiol supplementation alone, enhances thermotolerance in rats exercising at a high ambient temperature.

DTIC

Estrogens; Heat Tolerance; Heat Acclimatization; Physiological Tests; Physiological Effects

19980010037 Johns Hopkins Univ., School of Medicine, Baltimore, MD USA

Glycosphingolipids as Putative Receptor for Staphylococcal Enterotoxin-B in Cultured Human Kidney Cells ***Final Report, 1 Aug. 1994 - 31 Jul. 1997***

Chatterjee, Subroto, Johns Hopkins Univ., USA; Aug. 1997; 25p; In English

Contract(s)/Grant(s): DAMD17-94-C-4059

Report No.(s): AD-A332016; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

Staphylococcal enterotoxin-B (SEB) is a common enterotoxin that can cause diarrhea and death in man. In these studies we have developed a specific and sensitive assay for the detection of SEB (enzyme linked receptor-based immunodot) in human fluids, plasma and urine. Our structure/function studies have revealed that amino acid sequence (130-160) of SEB (peptide #9) imparts toxic effects including cell death in PT cells. In addition, we found that SEB can activate neutral sphingomyelinase (N-SMase) resulting in the hydrolysis of sphingomyelin to ceramide and phosphocholine. Ceramide, in turn induces programmed cell death (apoptosis). Interestingly, several of the SEB mutants of peptide #9 were found to abrogate SEB toxicity in human kidney cells. Our findings will of potential value for the food industry, and to help determine toxemia in our soldiers. Such studies will also elaborate the pathophysiology of SEB induced toxemia in man.

DTIC

Microorganisms; Staphylococcus; Kidneys; Cells (Biology); Pathogens

19980010111 Brigham and Women's Hospital, Boston, MA USA

Clinical Trial of the Effect of Exercise on Endogenous Circadian Period, Sleep and Performance ***Final Report, 1 Jul. 1994 - 30 Jun. 1997***

Czeisler, Charles A., Brigham and Women's Hospital, USA; Aug. 29, 1997; 7p; In English

Contract(s)/Grant(s): F49620-94-I-0398; AF Proj. 2312

Report No.(s): AD-A329706; AFOSR-97-0388TR; No Copyright; Avail: CASI; A02, Hardcopy; A01, Microfiche

In summary, the addition of the research studies conducted in year three of the project solidifies the notion that regular bouts of aerobic exercise affect the physiology of the thermoregulatory system in a phase-dependent manner. Preliminary results from the reaction time data continue to be extremely promising. These data suggest that aerobic exercise may have the potential to enhance neurobehavioral performance, as reflected by simple visual reaction time, particularly at the nadir of the temperature cycle where neurobehavioral deficits are known to be the greatest.

DTIC

Circadian Rhythms; Exercise Physiology; Thermoregulation

19980010175 Arizona Univ., Tucson, AZ USA

The Effects of Chronic JP-8 Jet Fuel Exposure on Lung Function ***Final Report, 15 May 1994 - 14 May 1997***

Witten, Mark L., Arizona Univ., USA; May 14, 1997; 7p; In English

Contract(s)/Grant(s): F49620-94-1-0297; AF Proj. 2312

Report No.(s): AD-A330006; AFOSR-TR-97-0512; No Copyright; Avail: CASI; A02, Hardcopy; A01, Microfiche

The past three years of work for the Air Force Office of Scientific Research has resulted in the development of a congenic mouse model of JP-8 jet fuel exposure, the role of substance P in the JP-8 jet fuel-induced lung injury process, and development of extensive collaborations with Dr David Harris (University of Arizona), Drs Korngut and Siegel (University of Wisconsin), and Dr Frank Witzman (Indiana University). We demonstrated that congenic mice deficient in the aryl hydrocarbon hydroxylase and N-acetyl transferase enzymes have increased lung permeability and pathological lung injury resulting from exposure to JP-8 jet fuel compared to their C57BL/6 parent strain. Consequently, we can conclude that one or both of these enzymes plays a role in the metabolism of JP-8 fuel in the lungs. Finally, we have conducted field studies for JP-8 jet fuel exposure at the Montana Air National Guard Base in Great Falls, Montana in March of 1997 and at Davis Montana Air Force Base in Tucson, Arizona. The purpose of this semi-cold weather (30 degree) F-16A engine start and warm weather (102 degree) F-16A engine start were to determine real-life' JP-8 jet fuel exposures at the ground crew positions and determine average JP-8 jet fuel concentration and particle size. The data was then compared against similar data generated in our JP-8 jet fuel exposure model.

DTIC

JP-8 Jet Fuel; Lungs; Exposure; Ground Crews; Hydrocarbons; Injuries

19980010448 Oklahoma State Univ., Stillwater, OK USA

Effect of Sub-Lethal Organic and Metallic Toxicant Concentrations on Neurological Biomarkers of Neonates ***Final Report, 7 Apr. 1995 - 6 Apr 1996***

Blankemeyer, James T., Oklahoma State Univ., USA; May 1996; 288p; In English

Contract(s)/Grant(s): DAMD17-95-2-5008

Report No.(s): AD-A328856; No Copyright; Avail: CASI; A13, Hardcopy; A03, Microfiche

Exposure of humans to lethal or clearly harmful levels of toxicants is straightforward to assess. Counting the number of survivors or enumerating injuries provides an accurate, repeatable method for assessing toxicant effect. However, chronic exposure to very low levels of toxicants is much more problematic. Effects to very low levels of toxicants often produces effects temporally separate from exposure and not linkable in a cause and effect relationship. Our study probed the relationship between low levels of toxicants and neurological responses. After exploratory assays of various neurotoxic chemicals, we used trimethyltin to assess neurological damage to embryos, the most sensitive stage of the life cycle. We found that we were able to detect these low levels of trimethyltin by video image analysis of neural fields using the electrochromic dye Di-4-ANEPPS. We also used analysis of retrograde transport of scrape-loaded tracer dye through neurons. We found that there was no detectable difference in the neuronal paths traced by the tracer dye.

DTIC

Embryos; Enumeration; Neurophysiology; Neurology; Life (Durability); Assaying; Image Analysis

19980010526 Armstrong Lab., Aerospace Medicine Directorate, Brooks AFB, TX USA

Autonomic Functions Associated with Blood Pressure Regulation and Orthostatic Performance in Women ***Final Report, 22 Dec. 1995 - 31 Aug. 1997***

Convertino, Victor A., Armstrong Lab., USA; Oct. 1997; 37p; In English

Contract(s)/Grant(s): AF Proj. 7755

Report No.(s): AD-A331912; AL/AO-TR-1997-0129; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

Functions of baroreflex control of heart rate and vascular resistance, adrenoreceptor responsiveness, indices of baseline vagal and sympathetic tone, plasma volume, and venous compliance were compared in men and women to test the hypothesis that greater orthostatic intolerance in women would be associated with impairment of specific mechanisms of blood pressure regulation. Heart rate (HR), stroke volume (SV), cardiac output (Q), mean arterial blood pressure (MAP), forearm (FVR) and leg (LVR) vascular resistance, catecholamines (NE), and changes in leg volume (%LV) were measured during various protocols of lower body negative pressure (LBNP), carotid stimulation, and infusions of adrenoreceptor agonists in 10 females and 10 males matched for age and fitness. LBNP tolerance for women (797 +/- 63 mmHg min) was 35% lower than for men. At presyncope, SV, Q, MAP and %LV were tolerance in females was associated with impairment of the heart rate response to carotid baroreceptor stimulation, lower baseline cardiac vagal activity, greater decline in Q and SV induced by LBNP, increased B1-adrenoreceptor responsiveness, greater vasoconstriction under equal LBNP, lower levels of NE at presyncope, and lower blood volume. Results support the hypothesis that women have significant deficiencies in mechanisms that underlie blood pressure regulation under orthostatic challenge. These findings should be considered in selection and training of women for military combat, especially in combat missions requiring high-G aerial maneuvers.

DTIC

Blood Pressure; Physiological Tests; Autonomic Nervous System; Physiological Responses; Orthostatic Tolerance; Females

19980010848 Army Research Inst. of Environmental Medicine, Military Nutrition and Biochemistry Div., Natick, MA USA

The Use of Caffeine to Enhance Cognitive Performance, Reaction Time, Vigilance, Rifle Marksmanship and Mood States in Sleep-Deprived Navy SEAL (BUD/S) Trainees, ***Jun. 1995 - Oct. 1997***

Coffey, Bryan, Army Research Inst. of Environmental Medicine, USA; Strowman, Shelley. R., Army Research Inst. of Environmental Medicine, USA; Tulley, Richard, Louisiana State Univ., USA; Tharion, William. J., Geo-Centers, Inc., USA; Shukitt-Hale, Barbara, Geo-Centers, Inc., USA; Desai, Manoj, Geo-Centers, Inc., USA; Oct. 1997; 102p; In English

Report No.(s): AD-A331982; No Copyright; Avail: CASI; A06, Hardcopy; A02, Microfiche

Caffeine has been shown to improve tasks with a vigilance component. The purpose of this study was to determine the effectiveness of caffeine in sleep-deprived individuals exposed to high levels of operational and environmental stress. Volunteers were 68 Navy SEAL trainees. Volunteers were administered caffeine (100, 200, 300 mg or placebo) after 72 hrs of sleep deprivation. Performance testing occurred 1-1.5 hrs and 8-10 hrs after caffeine or placebo administration. Tests included auditory and visual vigilance tests, four-choice reaction time, matching to sample, repeated acquisition, rifle marksmanship, mood and subjective sleepiness assessment. The combined effects of sleep deprivation and the operational and environmental stress of training significantly affected all measures adversely (ANOVAs, p less than 0.05 to 0.0001). Caffeine (200 or 300 mg) significantly improved (p less than 0.05) visual vigilance, reaction time, repeated acquisition, mood and alertness measures compared to placebo when sleep-deprived. Marksmanship was not affected by caffeine.

DTIC

Sleep Deprivation; Caffeine; Mental Performance; Reaction Time; Physiological Effects; Physiological Tests

19980010970 Colorado Univ., Denver, CO USA

Women at Altitude: Effects of Menstrual Cycle Phase and Alpha-Adrenergic Blockage on High Altitude Acclimatization ***Annual Report***

Moore, Lorna G., Colorado Univ., USA; Oct. 1997; 17p; In English

Contract(s)/Grant(s): DAMD17-95-C-5110

Report No.(s): AD-A331527; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

Little is known concerning the effects of high altitude exposure in women. In year 1, we evaluate the effects of menstrual cycle phase on high altitude acclimatization. Results indicated that the effects of the menstrual cycle were modest on the ventilatory, circulatory and metabolic responses hypoxia but that the volume regulatory adjustments were altered such that there tended to be greater fluid retention in the luteal phase subjects. The purpose of the studies conducted in year 2 (the present annual report) was to determine the role of alpha-1 adrenergic activity and its interaction with menstrual cycle phase in early altitude acclimatization. Fifteen young women were exposed to an effective altitude of 300 m in the USARIEM hyperbaric chamber for 52 hr on two occasions, once while being treated with an alpha-1 blocker (prazosin) in a randomized, double blind fashion. Definite alpha-1

adrenergic blockage was achieved as demonstrated by a rightward shift in the blood pressure response to an a-a alpha-adrenergic agonist, phenylephrine. Prazosin blocked the altitude-associated rise in systemic blood pressure during exercise and after tilt Hematocrit was lower in a-blocked than placebo-treated subjects, implying a relaxation of venous tone, but this effect appeared similar at low and high altitudes. Ventilation, hypoxic and hypercapnic ventilatory responses were unaffected by alpha-1 adrenergic blockade at either altitude. Analyses are continuing on other variables. Thus, the information obtained to a suggests that alpha-1 adrenergic activation is a key factor in orthostatic and exercise-related elevations in blood pressure at high altitude, in keeping with the study hypothesis.
DTIC
Menstruation; Altitude Acclimatization; Physiological Tests; High Altitude Environments; Hemodynamic Responses

19980011574 Air Force Inst. of Tech., Wright-Patterson AFB, OH USA
Frequency of Use and Cost of Selected Anesthetic Induction and Neuromuscular Blocking Agents
Anderson, Lorene R., Air Force Inst. of Tech., USA; Oct. 02, 1997; 82p; In English
Report No.(s): AD-A329980; AFIT/CI-97-034; No Copyright; Avail: CASI; A05, Hardcopy; A01, Microfiche

The purpose of this study was to identify the most frequently used agents for induction and neuromuscular blockade for intubation, and to identify variables which affected these choices. Anesthetic records (n=77) were obtained to examine the frequency of use of induction agents and neuromuscular blockers. Anesthesia care providers completed a survey (n=19) which provided information on induction and neuromuscular relaxation agent preferences, factors influencing their choices, and estimated costs of anesthesia induction and neuromuscular relaxation drugs. Cost estimates were compared to published costs of selected anesthesia drugs. The average cost of each of four combinations of induction and neuromuscular relaxation agents was compared to the average PACU time. Propofol was found to be the most frequently used agent for induction (75.3%). Succinylcholine was chosen most often for use as a neuromuscular relaxation agent (98.7%). The three most important factors influencing the choice of either agent was the physical status of the patient, the incidence of side effects produced by the drug, and the duration of action of the drug. Patients who received propofol had a shorter PACU stay (x=92.3 minutes) than those patients who received sodium thiopental (x=110.5 minutes). The estimated cost for propofol/succinylcholine per patient was $11.16 versus $2.38 for sodium thiopental/ succinylcholine. Based on a cost of $8.12 per minute for PACU care, the cost savings was estimated to be $139.00 for a patient who received propofol/succinylcholine compa red to a patient who received sodium thiopental/succinylcholine.
DTIC
Neuromuscular Transmission; Anesthetics; Blocking

19980011622 Army Research Inst. of Environmental Medicine, Natick, MA USA
The Effect of Choline Supplementation on Physical and Mental Performance of Elite Rangers, *Aug. - Sep. 1995*
Warber, John P., Army Research Inst. of Environmental Medicine, USA; Patton, John F., Army Research Inst. of Environmental Medicine, USA; Tharion, William J., Army Research Inst. of Environmental Medicine, USA; Popp, Kathryn A., Army Research Inst. of Environmental Medicine, USA; Mello, Robert P., Army Research Inst. of Environmental Medicine, USA; Nov. 1997; 106p; In English
Report No.(s): AD-A331975; No Copyright; Avail: CASI; A06, Hardcopy; A02, Microfiche

Dietary availability of choline, the precursor of the neurotransmitter, acetylcholine, is sufficient to provide the body's requirements under normal conditions. However, some reports indicated plasma choline levels fall following certain types of strenuous exercise and that depletion of choline may limit performance, while oral supplementation may delay fatigue. A double-blind crossover design was used to determine the relationship between plasma choline and fatigue during and after a 4 hr strenuous exercise. Fourteen Army Rangers participated in this study (ages 19-33 years, mean body fat 11% and VO2 max 60.3 ml. kg-1 min-1). Thirty mins after drinking a nonnutritive beverage with or without choline citrate (8.425 g), Rangers walked on a treadmill at 5.6 km/h, 3% grade, wearing a 29.5 kg rucksack for 20 km, equivalent to approximately 1950 Kcal energy expenditure. An identical dose of the choline supplement was given mid way through the treadmill walk. Post-test mn time-to-exhaustion, squat test, perceived exertion, marksmanship, short-term memory, mood states, lactate, glucose, CPK, lipids, and plasma choline were measured. Choline levels increased 128% after the mn-to-exhaustion during the choline supplemented phase but remained stable under the placebo conditions. No significant effects were seen with choline supplementation on any measures. Consequently, plasma choline was not depleted as a result of a weighted road march, a typical Ranger performance task, nor did the Rangers benefit from choline supplementation to enhance or delay fatigue under this exhaustive military task.
DTIC
Acetyl Compounds; Adipose Tissues; Choline; Citrates; Depletion; Diets; Dosage; Drinking; Exhausting; Exhaustion; Glucose; Lactates; Lipids; Memory; Mental Performance

19980011643 William Beaumont Army Hospital, El Paso, TX USA

Impact of Smoking on Aerobic and Anaerobic Performance During Upper and Lower Body Exercise in Female Soldiers ***Final Report, 1 Dec. 1994 - 31 Dec. 1995***

Weisman, Idelle M., William Beaumont Army Hospital, USA; Apr. 1996; 49p; In English

Contract(s)/Grant(s): MIPR-95MM5548

Report No.(s): AD-A332993; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

The impact of smoking on exercise performance of female soldiers is of interest to the military. Objectives: to study in female soldiers: (a) the chronic/acute effects of smoking on aerobic/anaerobic performance during lower/upper body exercise, (b) the aerobic/anaerobic capacity for lower/upper body exercise and to correlate these values with the Army physical fitness test (APFT). Methods: Healthy female soldiers, 12 smokers, after abstaining from smoking (COHb <2%)andaftersmoking(COHb:65%), and 22 non-smokers were studied. Maximal aerobic power and cardiopulmonary variables were measured during lower/upper body exercise using an automated exercise system. Maximal anaerobic power during lower/upper body exercise was evaluated using the Wingate test. Results and conclusions: The chronic I acute effects of light to moderate smoking does not appear to impact the aerobic/anaerobic capacity for lower/upper body exercise; female soldiers have a normal aerobic and anaerobic capacity for upper and lower body exercise with an average level of fitness; they appear to be equally fit for aerobic and anaerobic exercise; no correlation was observed between the APFT and indices of aerobic/anaerobic capacity; maximal aerobic capacity was 60% of men, 72% when normalized for body weight.

DTIC

Physical Exercise; Physical Fitness; Physiological Effects; Females

19980011685 Walter Reed Army Medical Center, Washington, DC USA

Pushup Performance by Women: Analysis of Modes of Failure ***Final Report, 1 Dec. 1994 - 30 Sep. 1995***

Boyea, Steven R., Walter Reed Army Medical Center, USA; Oct. 1995; 11p; In English

Report No.(s): AD-A332965; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

To analyze the modes of muscle failure during pushups in active duty women determining a single weak link in performance multiple modes of failure. 25 U.S. Army active duty women were prospectively studied. Each participated in eight sessions, separated by a minimum 48 hours, consisting of stretching warm ups then prefatigue of a specific muscle group to muscle failure with a predetermined exercise. The initial session set a baseline without prefatigue, the following sessions prefatigued the trapezius, latissimus dorsi, deltoid, pectorals, biceps, triceps, and abdominals. Studied 25 women, mean age of 33.5 yrs, 19 enlisted and 6 officers with a mean weight of 135.9 lbs. Baseline mean was 22 pushups. Prefatigue of pectorals gave a mean of 9 pushups, triceps mean 11 pushups), deltoid mean 15 pushups, abdominals mean 16 pushups, biceps mean 17 pushups, latissimus dorsi mean 17 pushups, and the trapezius mean 19 pushups. Prefatiguing of the pectorals and triceps give a significant decrease in pushups compared with other muscle groups.

DTIC

Physical Exercise; Females; Muscles

19980011792

Measurement of astigmatism by automated infrared photoretinoscopy

Gekeler, Florian, Univ. Eye Hospital, Germany; Schaeffel, Frank; Howland, Howard C.; Wattam-Bell, John; Optometry and Vision Science; July, 1997; ISSN 1040-5488; Volume 74, no. 7, pp. 472-482; In English; Copyright; Avail: Issuing Activity

There are basically two possibilities to measure cylindrical refractive errors by eccentric photorefraction. The first is to determine the size and the tilt of the light crescent in the subject's pupil. Sphere, cylinder, and axis can be obtained from two pictures with the knife edge at two different orientations by using equations derived by Wesemann et al. In natural eyes, the procedure has limitations because undetermined factors (not considered in the theory) affect size, shape, and intensity of the light crescent. A second possibility is to perform eccentric photorefraction separately in at least three different meridians. Methods. We have tested the power of the second possibility. The three critical parameters (sphere, cylinder, and axis) were calculated from Euler's law, which describes curvatures (or refractions) at any given angle. The procedure relied only on empirical calibration and not on a theoretical treatment of the optics. Therefore, it was not necessary to identify all factors that determine the path of light. Results. The procedure compared favorably with subjective refraction (first population: students, age 26-30 years, N = 7 (14 eyes); correlations: sphere, r = 0.983; cylinder, r = 0.867; axis, r = 0.935) and with a Canon R-1 Autorefractor (second population: children, age 4-14 years, N = 48 (96 eyes); correlations: sphere, r = 0.955; cylinder, r = 0.600; axis, r = 0.846). Conclusions. Because it is fast, the technique may be suitable for screening in children. The refractions in the different meridians are performed in real time (25 to 30 Hz) and a single reading (the average from 4-6 refractions in each of the 6 meridians) is obtained in 1-2 s. It constitutes

a major improvement to commercially available videorefractors which use measurements only in two meridians in conjunction with the formula by Wesemann et al., although it is still not precise enough to permit spectacle prescription.
Author (EI)
Infrared Radiation; Vision; Light (Visible Radiation); Refraction; Computation; Optical Correction Procedure; Error Analysis

19980011793
Ocular components measured by keratometry, phakometry, and ultrasonography in emmetropic and myopic optometry students
Goss, David A., Indiana Univ., USA; Van Veen, Hank G.; Rainey, Bill B.; Feng, Brian; Optometry and Vision Science; July, 1997; ISSN 1040-5488; Volume 74, no. 7, pp. 489-495; In English; Copyright; Avail: Issuing Activity

Ocular components were measured by keratometry, phakometry, and ultrasonography on 176 young adults. Refractive error was measured by retinoscopy. Mean vitreous depth was greater and the cornea was steeper in myopes than in emmetropes. There were no significant differences between myopes and emmetropes in mean anterior chamber depth, crystalline lens thickness, anterior crystalline lens radius, posterior crystalline lens radius, or crystalline lens power. Coefficients of correlation were calculated for each of the ocular components with refractive error for the entire group of 176 subjects. The components that showed statistically significant correlations with refractive error were vitreous depth and anterior corneal radius. Eyes with greater vitreous depths tended to have flatter anterior corneal surfaces. The slope of the principal axis relating these two variables was significantly different in emmetropes and myopes. Eyes with greater vitreous depths tended to have lesser crystalline lens power. Vitreous depth showed a statistically significant correlation with posterior lens radius, but not with anterior lens radius.
Author (EI)
Vision; Light (Visible Radiation); Refraction; Computation; Optical Correction Procedure; Imaging Techniques; Ultrasonics

19980011794
Effect of small focal errors on vision
Miller, Anthony D., CSIRO Mathematical and Information Sciences, Australia; Kris, Michy J.; Griffiths, Andrew C.; Optometry and Vision Science; July, 1997; ISSN 1040-5488; Volume 74, no. 7, pp. 521-526; In English; Copyright; Avail: Issuing Activity

The aim of this study was to quantify the effects of small plus focal errors on the quality of vision of wearers who habitually wear either no correction, or a low powered, distance only correction. Methods. Patients wore spectacles with small errors deliberately included for a 2-day trial wear period; a short subjective questionnaire, and some laboratory measures of visual function were also used to assess the effects of these focus errors. Results. A significant number of wearers notice, and are dissatisfied with, focal errors in distance vision as small as + 0.25 D, in both sphere and cylinder. Conclusion. This finding supports clinical practice in refining the refraction to the nearest 0.25 D. It suggests that for critical applications and for critical patients, the practice of slightly undercorrecting hypermetropes should be applied, so that patients can use a little of their own accommodation for optimal distance vision.
Author (EI)
Vision; Light (Visible Radiation); Refraction; Eyepieces; Error Analysis; Focusing

19980011796
Wavelength-dependent magnification and polychromatic image quality in eyes corrected for longitudinal chromatic aberration
Zhang, Xiaoxiao, Indiana Univ., USA; Thibos, Larry N.; Bradley, Arthur; Optometry and Vision Science; July, 1997; ISSN 1040-5488; Volume 74, no. 7, pp. 563-569; In English; Copyright; Avail: Issuing Activity

Theoretical calculations using a simple model eye in combination with achromatizing lenses or artificial pupils show that correcting wavelength-dependent refractive error or its effects can exaggerate wavelength-dependent magnification by up to a factor of 7. These calculations are confirmed experimentally, and their effects on retinal image quality are modeled. Because of the increased wavelength-dependent magnification, gains in polychromatic image quality produced by correcting wavelength-dependent refractive error (or minimizing its effects with small pupils) are generally restricted to a small region of the retina.
Author (EI)
Image Resolution; Vision; Aberration; Mathematical Models; Computation; Light (Visible Radiation); Refraction

19980011911
Oblique (off-axis) astigmatism of the reduced schematic eye with elliptical refracting surface
Wang, Yi-Zhong, Indiana Univ., USA; Thibos, Larry N.; Optometry and Vision Science; July, 1997; ISSN 1040-5488; Volume 74, no. 7, pp. 557-562; In English; Copyright; Avail: Issuing Activity

The oblique (off-axis) astigmatism of the Indiana Eye, an aspheric reduced-eye model of ocular chromatic aberration and spherical aberration, is computed across the visual field by using Coddington's equations for nonspherical surfaces of revolution. Our results show that the amount of astigmatism varies significantly with the shape of the refracting surface and with the axial location of the pupil. For a pupil located 1.91 mm from the apex of the refracting surface (as originally specified for the model), the calculated Sturm's interval was larger than that reported in the literature. However, by moving the model's pupil 0.84 mm axially away from the apex toward the nodal point, a close match was achieved between Sturm's interval of the model eye and published data from human eyes for eccentricities up to 60 deg. These results demonstrate that the aspheric reduced-eye model is capable of simultaneously accounting for the chromatic, spherical, and oblique astigmatic aberrations typically found in human eyes.
Author (EI)
Eye (Anatomy); Vision; Aberration; Mathematical Models; Computation; Light (Visible Radiation); Refraction

19980011912
Accommodation to stationary and moving targets
Kruger, Philip B., State Univ. of New York, USA; Aggarwala, Karan R.; Bean, Sharon; Mathews, Steven; Optometry and Vision Science; July, 1997; ISSN 1040-5488; Volume 74, no. 7, pp. 505-510; In English; Copyright; Avail: Issuing Activity

To test the hypothesis that the contrast of spectral components of the retinal image specifies ocular focus and controls reflex accommodation. Methods. Eight subjects viewed a stationary target at 0, 2.5, and 5 D in a Badal optometer, with longitudinal chromatic aberration (LCA) normal and reversed and in monochromatic (550 nm) light. Accommodation was monitored continuously during 40-s trials. Subjects also viewed the grating target as it moved sinusoidally (1.5 to 2.5 D) at 0.2 Hz under the same three conditions. Results. Subjects accommodated relatively accurately at all distances in the normal condition; three subjects had difficulty accommodating in monochromatic light at 5 or 0 D, and seven subjects could not maintain focus with LCA reversed. The accommodative response differed significantly in the three chromatic conditions both for stationary and moving targets. Conclusions. Relative contrast of long-, middle-, and short-wavelength components of the retinal image specifies ocular focus and drives reflex accommodation.
Author (EI)
Vision; Optometry; Aberration; Color; Gratings (Spectra)

53
BEHAVIORAL SCIENCES

Includes psychological factors; individual and group behavior; crew training and evaluation; and psychiatric research.

19980009130
Real-time visual behaviors with a binocular active vision system
Batista, Jorge, Univ. of Coimbra, Portugal; Peixoto, Paulo; Araujo, Helder; Proceedings - IEEE International Conference on Robotics and Automation; 1997; ISSN 1050-4729; Volume 4, pp. 3391-3396; In English; Automation, ICRA. Part 4 (of 4), Apr. 20-25, 1997, Albuquerque, NM, USA; Copyright; Avail: Issuing Activity

An active vision system has to enable the implementation of reactive visual processes and of elementary visual behaviors in real time. In this paper we describe the real-time implementation of several visual behaviors in an active vision system. Issues related to the real-time implementation are discussed, namely in what concerns the modeling of the measurements made in the image. Even though in most applications a fully calibrated system is not required, we also describe a methodology for calibrating the camera head, taking advantage of its degrees of freedom. These calibration parameters are used to evaluate the performance of the system. Another important issue of the operation of active vision binocular heads is their integration into more complex robotic systems. We claim that higher levels of autonomy and integration can be obtained by designing the system architecture based on the concept of purposive behavior. We show how this architecture can be used to implement a pursuit behavior using optical flow. Simultaneously vergence control can also be performed using the same visual processes.
Author (EI)
Binocular Vision; Real Time Operation; Computer Vision; Degrees of Freedom; Optical Flow (Image Analysis)

19980009262 Institute for Human Factors TNO, Soesterberg, Netherlands
A Field Study on the Development of Team Training Systems *Interim Report Een Veldstudie Naar de Ontwikkeling van Team Training*
vanBerlo, M. P. W., Institute for Human Factors TNO, Netherlands; Sep. 16, 1997; 62p; In English

Contract(s)/Grant(s): B96-036
Report No.(s): TM-97-B017; TD97-0238; Copyright; Avail: Issuing Activity (TNO Human Factors Research Inst., Kampweg 5, 3769 De Soesterberg, The Netherlands), Hardcopy, Microfiche

Despite the acknowledgment of the importance of team performance and team training, relatively few endeavours have been undertaken to train teams in a systematic way (excepting Crew Resource Management training). A possible explanation could be that there is no methodology to guide the instructional developers and trainers in designing, executing and evaluating team training systems. to ascertain which guidelines should be included in a methodology supporting the systematic development of team training systems, both a literature review and a field study have been conducted. In this report, the results of the field study will be discussed. After a brief introduction of the topic (chapter 1), in chapter 2 the framework of the field study is described. Twelve interviews were conducted with persons of the Royal Netherlands Air Force, the Royal Netherlands Navy, the Royal Netherlands Army, the Royal Military Police, and one civil organization. Information concerning team training simulators was obtained from an additional document study. In chapter 3 the results are presented, structured around the respective categories of questions: background information, organization and premises, analysis, design and execution, performance measurement and feedback, instructional methods and training devices, evaluation and maintenance, and concluding remarks. Based on the results, in chapter 4 the weak points in designing, executing and evaluating team training are discussed. Chapter 5 concludes with an overview of proposed further research.
Author
Training Simulators; Training Devices; Resources Management

19980009263 Institute for Human Factors TNO, Soesterberg, Netherlands
Effects of Fatigue and Social Environment on Performance: Individual and Team Tasks ***Interim Report Effecten van Vermoeidheid en Sociale Omgeving op Prestatie: Individuele en Team Taken***
vanOrden, C. Y. D., Institute for Human Factors TNO, Netherlands; Gaillard, A. W. K., Institute for Human Factors TNO, Netherlands; Langefeld, J. J., Institute for Human Factors TNO, Netherlands; Jul. 07, 1997; 40p; In English
Contract(s)/Grant(s): B95-102
Report No.(s): TD97-0228; TM-97-B011; Copyright; Avail: Issuing Activity (TNO Human Factors Research Inst., Kampweg 5, 3769 De Soesterberg, The Netherlands), Hardcopy, Microfiche

The current experiment is the fifth in a series of studies that investigate the effects of fatigue and social environment on task performance. The following topics were studied: (1) Which tasks are most vulnerable to fatigue? (2) to what extent can the presence of another person during task performance compensate fatigue effects? (3) to what extent can I social loafing' be prevented by giving a group public feedback on all group members' individual performance? (4) Does feedback motivate even without a bonus? (5) Does the type of feedback (individual or group feedback) have to be adjusted to the type of task (individual or interdependent team task)? Subjects, divided into four-person groups, worked 20 hours continuously (five sessions of four hours each) on three individual tasks that differed in cognitive complexity (Reaction Time Task (RTT); Memory Search Task (MST); and Contaminant Monitoring Task (CMT), and on a team task (TANDEM). The individual tasks were carried out both alone and in presence of another subject. Half of the subjects got (public) feedback on all group members' individual scores, the other half only got a group score. The tasks differed in their sensitivity to fatigue. Performance on the two simplest tasks (RTT and MST) deteriorated most over night, compared with the more complex CMT and the team task. One should realise, however, that during the experiment a rather strong learning effect occurred on both the CMT and the team task. This learning effect might have interfered with the fatigue effects. Nevertheless, it can be concluded that cognitive complex, and therefore maybe also more interesting tasks, are less vulnerable to fatigue than simple tasks. In general, subjects performed better on the individual tasks when they worked in presence of another subjects, as compared to alone. This was especially the case in the last sessions. So, the more tired one is, the more one profits from working with someone else. Subjects who got feedback on their individual scores performed better than those who got group feedback. It seems that 'social loafing' indeed can be prevented by making all individual group members' scores public. A comparison with the previous experiment shows that the performance of subjects who get individual feedback is even better if they are promised a bonus. Providing individual feedback is thought not to be very effective when people work on interdependent team tasks, since in such tasks they can hardly influence their own individual performance. This hypothesis that individual feedback is only efficient with individual tasks and that group feedback is better with interdependent team tasks, unfortunately could not be tested in this experiment, because there was too little variance in the individual scores on the team task.
Author
Human Performance; Fatigue (Biology); Tasks

19980009337

On optimizing tracking performance for visual servoing

Vincze, Markus, Technical Univ. Vienna, Austria; Weiman, Carl F. R.; Proceedings - IEEE International Conference on Robotics and Automation; 1997; ISSN 1050-4729; Volume 4, pp. 2856-2861; In English; Automation, ICRA. Part 4 (of 4), Apr. 20-25, 1997, Albuquerque, NM, USA; Copyright; Avail: Issuing Activity

Visual tracking is a fundamental primitive in advanced sensing tasks, such as vision-guided manipulation or surveillance. We investigate the influence of window size and image tessellation on tracking performance and show that optimal performance for uniform image tessellations is obtained when image sampling time equals image processing time. The performance measures cover velocity, acceleration, and jerk by utilizing different types of feature prediction. We then show that one-dimensional windows can improve performance for specific targets. Finally we show that multi-resolution approaches (log-polar and image pyramid) greatly improve tracking performance.

Author (EI)

Computer Vision; Positioning; Image Resolution; Optimization

19980009338

Experimental evaluation of uncalibrated visual servoing for precision manipulation

Jagersand, Martin, Univ. of Rochester, USA; Fuentes, Olac; Nelson, Randal; Proceedings - IEEE International Conference on Robotics and Automation; 1997; ISSN 1050-4729; Volume 4, pp. 2874-2880; In English; Automation, ICRA. Part 4 (of 4), Apr. 20-25, 1997, Albuquerque, NM, USA; Copyright; Avail: Issuing Activity

In this paper we present an experimental evaluation of adaptive and non-adaptive visual servoing in 3, 6 and 12 degrees of freedom (DOF), comparing it to traditional joint feedback control. While the purpose of experiments in most other work has been to show that the particular algorithm presented indeed also works in practice, we do not focus on the algorithm, but rather on properties important to visual servoing in general. Our main results are: positioning of a 6 axis PUMA 762 arm is up to 5 times more precise under visual control, than under joint control. Positioning of a Utah/MIT dextrous hand is better under visual control than under joint control by a factor of 2. We also found that a trust-region-based adaptive visual feedback controller is very robust. For m tracked visual features the algorithm can successfully estimate online the m x 3 (m greater than or = 3) image Jacobian (J) without any prior information, while carrying out a 3 DOF manipulation task. For 6 and higher DOF manipulation, a rough initial estimate of J is beneficial. We also verified that redundant visual information is valuable. Errors due to imprecise tracking and goal specification were reduced as the number of visual features, m, was increased. Furthermore highly redundant systems allow us to detect outliers in the feature vector, and deal with partial occlusion.

Author (EI)

Computer Vision; Degrees of Freedom; Feedback Control; Robot Arms; Pattern Recognition

19980009389

Real-time visual tracking of 3-D objects with dynamic handling of occlusion

Wunsch, P., German Aerospace Research Establishment - DLR, Germany; Hirzinger, G.; Proceedings - IEEE International Conference on Robotics and Automation; 1997; ISSN 1050-4729; Volume 4, pp. 2868-2873; In English; Automation, ICRA. Part 4 (of 4), Apr. 20-25, 1997, Albuquerque, NM, USA; Copyright; Avail: Issuing Activity

Position-based visual servoing requires estimating and tracking the three dimensional position and orientation of a 3-D target object from camera images. This paper describes a novel approach to the problem that consists of two steps: First, a set of spatial pose constraints is derived from image features, by means of which 3-D object pose is calculated with an efficient model-fitting algorithm. Kalman-filtering is then used to estimate object velocity and acceleration. Compared to previous approaches that use Kalman-filters to directly estimate the object state from image features, the proposed method has a variety of advantages: Computation time is only O(n) rather than O(n(sup 3)) where n is the number of image features considered, sensor fusion is simplified and temporal estimation is decoupled from the choice of image features. The last point is of particular importance if occlusions that may occur during tracking are to be predicted and dynamically handled. With the tracking method proposed, a robot could be precisely controlled with respect to static objects and robustly follow targets moving in 6 degrees of freedom, while occlusions were continuously predicted and appropriate features automatically selected at video rate (25 Hz). High robustness is obtained by Hough transform-based feature extraction.

Author (EI)

Optical Tracking; Real Time Operation; Computer Vision; Algorithms; Mathematical Models; Kalman Filters

19980009625 Institute for Human Factors TNO, Soesterberg, Netherlands

Target Acquisition in Complex Scenes, Part A: Search and Conspicuity Models ***Final Report, 15 Aug. 1995 - 14 Aug. 1996***

Toet, A., Institute for Human Factors TNO, Netherlands; Nov. 1996; 75p; In English

Contract(s)/Grant(s): F49620-95-I-0495

Report No.(s): AD-A332390; No Copyright; Avail: CASI; A04, Hardcopy; A01, Microfiche

A visual search and detection experiment is performed on a set of complex natural images with military vehicles as targets. The area under the resulting cumulative detection probability curve of each target is adopted as a characteristic measure for its visual distinctness. The visual distinctness rank order induced by this measure is adopted as the reference rank order. This study investigates the capability of several digital target distinctness metrics and the psychophysically determined target visual lobe (i.e., the minimal distance between target and eye-fixation at which the target is no longer distinguishable from its surroundings) to reproduce the above-mentioned reference rank order. The visual lobe indeed appears a useful predictor of human performance in a visual search and detection task. Models of the early human visual system, a normalized root-mean square metric, and the edge distance metric introduced in this report, all seem to induce a visual distinctness rank ordering that agrees with human visual perception. Metrics based (1) on first order statistics of the graylevel histogram, (2) on the intersection of (oriented) graylevel histograms of target and background, and (3) on a combination of area and edge contrast, all correlate poorly with human observer performance. The CAMAELEON model (based on histogram intersection) is also highly sensitivity to variations in the definition (size and shape) of the target and background masks. The Perceptual Distortion model induces a visual target distinctness rank ordering identical to the one resulting from human observer performance, and therefore shows the best overall performance of all models and metrics tested in this study.

DTIC

Target Acquisition; Military Vehicles

19980009762 Institute for Human Factors TNO, Soesterberg, Netherlands

Team Training versus Team Building and Cooperative Learning: Defining the Field of Research ***Interim Report Team Training vs Team Building en Cooperatief Leren: Afbakening van het Onderzoeksterrein***

vanBerio, M. P., Institute for Human Factors TNO, Netherlands; Sep. 19, 1997; 23p; In Dutch

Report No.(s): AD-A332270; TNO-TM-97-B019; TDCK-TD-97-0240; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

Training is one of the factors influencing the effectiveness of teams. The concept team training, however, is often confused with the concept team building. Although the ultimate goal of both team training and team building is the same, there are considerable differences between the two. Also, team training is wrongly conceived of as cooperative learning. Again, there are similarities, but distinctions as well. In this report the differences and similarities between team training on the one hand, and team building and cooperative learning on the other hand, are discussed, with the purpose to define as clearly as possible the research on team training design. The implications of this comparison, and the experiences acquired in the fields of team building and cooperative learning, for the research on a methodology for developing team training systems, are discussed.

DTIC

Education; Teams; Performance Tests

19980009813 Institute for Human Factors TNO, Soesterberg, Netherlands

Effects of Fatigue and Social Environment on Performance: Individual and Team Tasks

vanOrden, C. Y., Institute for Human Factors TNO, Netherlands; Gaillard, A. W., Institute for Human Factors TNO, Netherlands; Langefeld, J. J., Institute for Human Factors TNO, Netherlands; Jul. 07, 1997; 46p; In Dutch

Report No.(s): AD-A332384; TNO-TM-97-B011; TDCK-TD97-0228; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

The current experiment is the fifth in a series of studies that investigate the effects of fatigue and social environment on task performance. The following topics were studied: (a) Which tasks are most vulnerable to fatigue? (b) to what extent can the presence of another person during task performance compensate fatigue effects? (c) to what extent can 'social loafing' be prevented by giving a group public feedback on all group members' individual performance? (d) Does feedback motivate even without a bonus? (e) Does the type of feedback (individual or group feedback) have to be adjusted to the type of task (individual or interdependent team task)? Subjects, divided into four-person groups, worked 20 hours continuously (five sessions of four hours each) on three individual tasks that differed in cognitive complexity (RTT: Reaction Time Task; MST: Memory Search Task; CMT: Contaminant Monitoring Task), and on a team task (TANDEM). The individual tasks were carried out both alone and in presence of another subject. Half of the subjects got (public) feedback on all group members' individual scores, the other half only got a group score. The tasks differed in their sensitivity to fatigue. Performance on the two simplest tasks (RTT and MST) deteriorated most

over night, compared with the more complex CMT and the team task. One should realise, however, that during the experiment a rather strong learning effect occurred on both the CMT and the team task. This learning effect might have interfered with the fatigue effects. Nevertheless, it can be concluded that cognitive complex, and therefore maybe also more interesting tasks, are less vulnerable to fatigue than simple tasks. In general, subjects performed better on the individual tasks when they worked in presence of another subjects, as compared to alone. This was especially the case in the last sessions.
DTIC
Fatigue (Biology); Human Performance; Social Factors; Cognition; Tasks

19980009821 TRADOC Analysis Command, White Sands Missile Range, NM USA
Distance Learning Annotated Bibliography ***Final Report, Feb. - May 1996***
Howard, Fay S., TRADOC Analysis Command, USA; Jun. 1997; 128p; In English
Report No.(s): AD-A330045; TRAC-WSMR-TR-97-015; No Copyright; Avail: CASI; A07, Hardcopy; A02, Microfiche

This study was conducted for the TRADOC Deputy Chief of Staff for Training. This report reviews relevant studies and articles on distance learning (DL) to support the implementers of the DL plan. The annotated bibliography contains summaries of 106 articles from military, industry, and universities. The main report divides the 106 articles into ten categories. The categories were selected based on interest expressed from the proponent and commonalities of the literature. The categories are evaluations of DL; guidelines for planning and implementing DL; computer based training, computer aided training, and computer mediated communication; video teletraining, videotapes, and interactive videodisk; professional education; student interaction with instructors other students, and technology; reviews of DL literature; descriptions of some specific DL programs; cost effectiveness and system costs; and miscellaneous. These principal results were summarized from the articles. All forms of DL are at least as effective as traditional instruction in most instances. Course development for DL could be costly but the number of people trained could recoup the costs quickly. Instructors for DL would at least initially need training in interaction skills, summary techniques, oral communication skills, and DL equipment operation. Costs for both the technology and course conversions were high but higher enrollments over a period of time would offset the costs.
DTIC
Bibliographies; Computer Assisted Instruction

19980009975
Above real-time training
Miller, L., Univ. of Central Florida; Stanney, K.; Guckenberger, D.; Guckenberger, E.; Ergonomics in Design; July, 1997; ISSN 1064-8046; Volume 5, no. 3, pp. 21-24; In English; Copyright; Avail: Issuing Activity

Many organizations have turned to cost-effective techniques that use existing equipment in order to better train their personnel. One such solution is the concept of above real-time training (ARTT), a relatively recent approach to training whereby pilots are placed in a simulated environment running at faster-than-normal speed. These studies have demonstrated that time-compressed training improves performance, increases retention, and reduces stress compared with conventional training. ARTT also reduces perceived workload of above-real-time-trained pilots when they are in real time.
Author (revised by EI)
Real Time Operation; Simulators; Personnel Development; Human Factors Engineering; Hydroelectricity

19980010018 Walter Reed Army Inst. of Research, Washington, DC USA
Assessment of the Impact of Pre-military and Military Trauma on the Physical and Psychological Well-Being of Female and Male Active Duty Soldiers ***Final Report***
Knudson, Kathryn H., Walter Reed Army Inst. of Research, USA; Dec. 1996; 55p; In English
Report No.(s): AD-A330012; No Copyright; Avail: CASI; A04, Hardcopy; A01, Microfiche

This study surveyed over 1000 female and male active duty soldiers to assess the impact of pre-military and military trauma on their physical and psychological well-being. The survey contained pertinent demographic information and a series of well-established scales in order to determine the history of trauma and physical and psychological symptoms, to include Post-Traumatic Stress Disorder (PTSD). The analyses examined the relationships between trauma, social support/unit cohesion, health risks and a history of reported symptoms of PTSD and other psychological and physical problems. Recommendations are presented which may help to mitigate development of such problems.
DTIC
Psychological Factors; Signs and Symptoms; Surveys; Males; Females; Health

19980010107 NERAC, Inc., Tolland, CT USA
Random Dot Stereograms: Latest Citations from the INSPEC Database
Feb. 1996; In English; Page count unavailable.
Report No.(s): PB96-862347; Copyright Waived; Avail: Issuing Activity (Natl Technical Information Service (NTIS)), Microfiche

The bibliography contains citations concerning the perception of depth, motion, and direction using random dot patterns. Citations focus on visual perception of random dot stereograms and kinematograms, with an emphasis on visual neurophysiology, physiological models, and cellular biophysics. Computer simulation, stereo image processing, filtering and prediction theory, artificial intelligence and neural nets represent coverage. The citations also examine stereopsis, spatio-temporal analysis, and modeling of visual perception.
NTIS
Bibliographies; Space Perception; Visual Perception; Computerized Simulation; Statistical Distributions; Biophysics

19980010126 Institute for Human Factors TNO, Soesterberg, Netherlands
A Proposal for Research on a Methodology for Developing Team Training Systems ***Interim Report***
Vannerio, M. P. W., Institute for Human Factors TNO, Netherlands; Sep. 19, 1997; 33p; In English
Report No.(s): AD-A332225; TM-97-B018; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

Despite the acknowledgment of the importance of team performance and team training, relatively few endeavors have been undertaken to actually train teams in a systematic way. A possible explanation could be that there is not yet a methodology to guide the instructional developers and trainers in designing, executing, and evaluating team training systems. The research question to be answered in this study is which guidelines should be included in a methodology supporting the systematic development of team training systems. In order to give an answer to this question the following strategy is proposed: (1) conduct a literature study, (2) conduct a field study, (3) develop a prototype of the methodology, (4) conduct an expert evaluation, (5) test the prototype in various experiments, and (6) apply the methodology in real life cases. This strategy is discussed extensively. The results of the literature study and the field study are briefly reviewed.
DTIC
Training Devices; Human Performance; Education; Proposals; Teams

19980010617 Gallaudet Coll., Washington, DC USA
NASA's Technical Experience for Select Students Program ***Final Report***
1997; 21p; In English
Contract(s)/Grant(s): NAG5-2943
Report No.(s): NASA/CR-97-206444; NAS 1.26:206444; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

To provide college students with disabilities majoring in technical fields a challenging career-oriented work experience which would lead to further employment at the Goddard Space Flight Center.
Author
Education; NASA Programs

19980010812 Colorado Univ., Dept. of Psychology, Boulder, CO USA
Models of Working Memory ***Final Report, Apr. - Sep.1997***
Miyake, Akira, Colorado Univ., USA; Shah, Priti, Colorado Univ., USA; Nov. 28, 1997; 9p; In English
Contract(s)/Grant(s): N00014-97-I-0547
Report No.(s): AD-A331951; No Copyright; Avail: CASI; A02, Hardcopy; A01, Microfiche

Working memory is a basic cognitive mechanism (or set of mechanisms) that is responsible for keeping track of multiple task related goals and subgoals, or integrating multiple sources of information. As such, it is essential for any complex cognitive task, such as planning an airplane's route or learning new computer software. Understanding the mechanisms and structures underlying working memory is, hence, one of the most important scientific issues that need to be addressed to improve the efficiency and performance of individuals on such cognitive tasks in a technological setting. A good understanding of working memory should lead to effective practical applications, such as the design of better computer interfaces, and novel techniques for training new personnel on complex information processing tasks. The goal of the symposium was to promote a better understanding of the architecture and mechanisms that underlie working memory as well as the practical implications of these important issues. The

symposium was specifically dedicated to detailed systematic comparisons of existing models and theories of working memory. Thus, we included several features that would facilitate active communication and collaborative problem solving among participants during the symposium. Specifically, we used an issue based approach to theory comparison, in which each participant addressed a common set of important theoretical questions that have been guiding the current research in the field.
DTIC
Memory; Models; Performance Tests

19980010834 Institute for Human Factors TNO, Soesterberg, Netherlands
A Field Study on the Development of Team Training Systems ***Een veldstudie naar de ontwikkeling van team training***
vanBerlo, M. P., Institute for Human Factors TNO, Netherlands; Sep. 16, 1997; 68p; In dut
Report No.(s): AD-A332155; TNO-TM-97-B017; TDCK-TD-97-0238; No Copyright; Avail: CASI; A04, Hardcopy; A01, Microfiche

Despite the acknowledgment of the importance of team performance and team training, relatively few endeavors have been undertaken to train teams in a systematic way excepting Crew Resource Management training. A possible explanation could be that there is no methodology to guide the instructional developers and trainers in designing, executing and evaluating team training systems. to ascertain which guidelines should be included in a methodology supporting the systematic development of team training systems, both a literature review and a field study have been conducted. In this report, the results of the field study will be discussed. After a brief introduction of the topic chapter 1, in chapter 2 the framework of the field study is described. Twelve interviews were conducted with persons of the Royal Netherlands Air Force, the Royal Netherlands Navy, the Royal Netherlands Army, the Royal Military Police, and one civil organization. Information concerning team training simulators was obtained from an additional document study. In chapter 3 the results are presented, structured around the respective categories of questions: background information, organization and premises, analysis, design and execution, performance measurement and feedback, instructional methods and training devices, evaluation and maintenance, and concluding remarks. Based on the results, in chapter 4 the weak points in designing, executing and evaluating team training are discussed. Chapter 5 concludes with an overview of proposed further research.
DTIC
Armed Forces (USA); Resources Management

19980010973 Army Aeromedical Research Lab., Fort Rucker, AL USA
Assessment of Aircrew Stress ***Final Report***
Katz, Lawrence C., Army Aeromedical Research Lab., USA; Oct. 1997; 53p; In e
Contract(s)/Grant(s): Proj. 3M1-62787-A-879
Report No.(s): AD-A331652; USAARL-RN-97-37; No Copyright; Avail: CASI; A04, Hardcopy; A01, Microfiche

A questionnaire was developed and administered to 21 aircrew members of a medical evacuation unit. Respondents were asked about the causes of stress in their lives, coping skills, belief systems, and stress symptoms. Scores on 21 scales within these 4 categories were quantified and analyzed using correlations and regression analysis, to reveal problem areas, strengths, and interrelationships. A stress profile was generated for this unit, indicating strengths in the areas of relationship stability and relational rewards, but pointing to work changes and ongoing work pressures as significant stressors. Crewmembers use active, flexible problem-solving to their benefit in coping with stressors, but fail to seek support from others and often attempt to control the uncontrollable. Respondents are optimistic with a healthy self-esteem, but avoid expressing their own thoughts and feelings and believe they are powerless to impact their own lives. A symptom model was generated, illustrating the connection between a perceived lack of work rewards and physical and behavioral symptoms and the connection between harboring resentments and behavioral and emotional symptoms, for this unit. In addition, a pessimistic outlook was found to be related to physical symptoms and relationship pressures were related to emotional symptoms. Recommendations focused on how this information might be used by the unit command to guide efforts in minimizing unnecessary stress and optimizing crewmembers' ability to cope. The study demonstrated the utility of this questionnaire for assessing unit-specific stress factors and guiding interventions.
DTIC
Flight Crews; Signs and Symptoms; Stress (Biology); Emotional Factors

54
MAN/SYSTEM TECHNOLOGY AND LIFE SUPPORT

Includes human engineering; biotechnology; and space suits and protective clothing. For related information see also 16 Space Transportation.

19980009315

Developing of an eye movement tracking type head mounted display: Capturing and displaying real environment images with high reality

Iwamoto, Kazuyo, AIST-MITI, Japan; Tanie, Kazuo; Proceedings - IEEE International Conference on Robotics and Automation; 1997; ISSN 1050-4729; Volume 4, pp. 3385-3390; In English; Automation, ICRA. Part 4 (of 4), Apr. 20-25, 1997, Albuquerque, NM, USA; Copyright; Avail: Issuing Activity

This paper describes the Head Mounted Display (HMD) system which can capture and display images with high reality. HMD is often used for virtual reality (VR) or tele-robotics. Conventional HMD has the disadvantages of small screen size and low resolution, because the scanning lines of such a conventional display device are limited. Therefore, the resolution is not enough for tele-robotics applications which need real environment images with high reality. In order to address these problems, an Eye Movement Tracking Type Head Mounted Display (EMT-HMD) is being developed. The EMT-HMD can display wide viewing angle and high resolution images of the environment. The theory is that a small, high resolution image is displayed at view point of the operator and, a wide, low resolution image is displayed at the periphery. Human can see an object as a high, resolution image only near the view point. Therefore, the operator who wears the EMT-HMD can feel that the displayed image is wide view angle and high resolution. In this paper, an image capturing system of real environment images is discussed. Next, some evaluation experiments for displaying real environment images are introduced using an EMT-HMD system and an image capturing system.
Author (EI)

Eye Movements; Computer Vision; Image Resolution; Display Devices

19980009350 Institute for Human Factors TNO, Soesterberg, Netherlands

Interference Between 6 degrees of Freedom in a 3D Hand Controller ***Interim Report Interferentie Tussen Vrijheidsgraden bij een 3D Stuurmiddel***

Korteling, J. E., Institute for Human Factors TNO, Netherlands; Oving, A., Institute for Human Factors TNO, Netherlands; vanEmmerik, M. L., Institute for Human Factors TNO, Netherlands; vanErp, J. B. F., Institute for Human Factors TNO, Netherlands; Jul. 04, 1997; 36p; In English

Contract(s)/Grant(s): B97-031

Report No.(s): TD97-0227; TM-97-B010; Copyright; Avail: Issuing Activity (TNO Human Factors Research Inst., Kampweg 5, 3769 De Soesterberg, The Netherlands), Hardcopy, Microfiche

A six Degree of Freedom (DOF) hand controller is a device that can be used for the simultaneous control of multiple axes. These kinds of control tasks are common in areas such as teleoperation. Multi-axis control may be problematic as a consequence of interference i.e., the control of a certain DOF affected the simultaneous control of another. Irrespective whether the cause of this interference lies in the operator's motor system or in his information processing system, it can be detrimental to task performance. When input on one DOF always results in undesired input on another DOF, the nature of this interference is systematic (cross-talk). The magnitude of the interference is probably affected by the number of DOFs that has to be controlled simultaneously. This was investigated in an experiment in which a compensatory tracking task was performed. In this task one DOF of a cursor in a perspective display was disturbed (externally). Subjects had to compensate this disturbance using a 6-DOF hand controller. At the same time they had to minimize input on the other (irrelevant to tracking) DOFS. It was investigated whether there were differences between tracking performance between each separate degree of freedom (X, Y, Z, Roll, Pitch, or Yaw). Furthermore, the effect of additional (irrelevant) DOFs that had to be controlled simultaneously (0, 1, or 5), was examined. With regard to the irrelevant degrees of freedom, the steering error thus was completely caused by incorrect, accidental, steering inputs. Error on the relevant DOF was a sum of this incorrect steering input and the disturbance signal. Both these errors (expressed in RMS scores) can be used to indicate the extent to which degrees of freedom interfered with each other. In this experiment a relative RMS score was calculated by dividing the RMS score with the mean RMS error score from the 1-DOF condition (no irrelevant DOFs) that was used as a baseline condition. This way, it was possible to gain insight in the performance increment or decrement as a function of the number of DOFs that had to be controlled. Through determination of the correlations between each combination of two degrees of freedom the extent to which systematic interference occurred was investigated - The experimental results show that in the 1-DOF condition tracking error was largest on Z with regard to translations and on Pitch with regard to rotations. This can be related to the effectivity of the presentation of the z-axis (i.e., used depth cues and compression) in the used perspective display. Furthermore, performance on relevant as well as irrelevant DOFs decreased when the number of visible degrees of free-

dom that had to be controlled increased. These limitation are attributed to the limited information processing capacity of the human operator. In relation to the other DOFs, this performance decrement for Z was substantially larger whereas it was smaller for X Again this may be related to the effectivity of presentation of the different axes on the display. A clear training effect diminished the effect of interference in the second block of trials. For each DOF in each condition this effect was of the same magnitude, Input on a relevant DOF and input on an irrelevant DOF were always significantly correlated. The amount of cross-talk between degrees of freedom did not change with the number of DOFs that had to be controlled. For half the combinations cross-talk even remained the same in the conditions without any visual information on the irrelevant DOFs. Therefore, it seems that cross-talk mainly results from motor limitations of the operator. Increasing the amount of haptic information in the hand controller, probably will help the operator to distinguish the degrees of freedom more easily. This may result in a reduction of cross-talk and better control.
Author
Degrees of Freedom; Control Equipment; Human Performance; Root-Mean-Square Errors

19980010028 Office of the Under Secretary of Defense (Acquisitions), Washington, DC USA
Joint Modeling and Simulation System (JMASS), Joint Initial Requirements Document (JIRD)
Feb. 28, 1997; 18p; In English
Report No.(s): AD-A332061; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

The Joint Modeling and Simulation System (JMASS) requirements will evolve through multiple stages. The purpose of this document is to define the initial overall programmatic requirements, high level capabilities, operation and support requirements for JMASS. Pilot projects will be used to refine and further specify the requirements in this document. Implementation of the specific requirements will be accomplished by a Program Office. JMASS is designed to support acquisition as defined in the Department of Defense (DoD) Regulation 500O.2-R. JMASS provides a software architecture for the development of models, configuration of models into simulations, execution of simulations, and post processing of data obtained from the simulation. The JMASS software facilitates interoperability with other simulations in accordance with DoD accepted standards. Additionally, it defines and implements a set of standards and documentation for JMASS compliant models. It provides tools that assist in the development and application of reusable models and model components. Standards defined and implemented by JMASS shall include: (1) Guidelines for the development of JMASS compliant models and documentation. These guidelines are called the Software Structural Model (SSM); (2) Tools to implement the SSM; (3) Model-to-model and model-to-system interfaces; (4) Tool-to-system interfaces; (5) Guidelines and tools for porting legacy models to JMASS; and (6) Man machine interface modeling.
DTIC
Software Engineering; Computerized Simulation; Defense Program; Government Procurement; Architecture (Computers)

19980010173 National Academy of Sciences - National Research Council, Committee on Military Nutrition Research, Washington, DC USA
Emerging Technologies for Nutrition Research: Potential for Assessing Military Performance Capability
Carlson-Newberry, Sydne J., National Academy of Sciences - National Research Council, USA; Costello, Rebecca B., National Academy of Sciences - National Research Council, USA; Jan. 1997; 714p; In English
Contract(s)/Grant(s): DAMD17-94-J-4046
Report No.(s): AD-A329691; No Copyright; Avail: CASI; A99, Hardcopy; A06, Microfiche

This publication, Emerging Technologies for Nutrition Research: Potential for Assessing Military Performance Capability, is the latest in a series of reports based on workshops sponsored by the Committee on Military Nutrition Research (CMNR) of the Food and Nutrition Board (FNB), Institute of Medicine, National Academy of Sciences. Other workshops or symposia have included such topics as food components to enhance performance; nutritional needs in hot, cold, and high-altitude environments; body composition and physical performance; nutrition and physical performance; cognitive testing methodology; and fluid replacement and heat stress. These workshops form part of the response that the CMNR provides to the Commander, U.S. Army Medical Research and Materiel Command, regarding issues brought to the committee through the Military Nutrition Division (currently the Military Nutrition and Biochemical Division) of the U.S. Army Research Institute of Environmental Medicine (USARIEM) at Natick, Massachusetts.
DTIC
Medical Science; Military Technology; Research and Development

19980010931 Army Aeromedical Research Lab., Fort Rucker, AL USA
Evaluation of the Communications Earplug in the H-53 and CH-46 Helicopter Environments ***Final Report***
Mozo, Ben T., Army Aeromedical Research Lab., USA; Murphy, Barbara A., Army Aeromedical Research Lab., USA; Sep. 1997; 24p; In English

Report No.(s): AD-A331662; USAARL-97-36; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

Noise levels inside military helicopters generally exceed noise exposure limits established by DOD Instruction 6055.12, 'Hearing conservation' (1991). Noise levels in helicopters with higher load capacities such as the CH-47, CH-46, and H-53 are extremely high and sometimes exceed the helmet's capability to provide adequate hearing protection for crewmembers. Noise compromises communication because of inadequate speech signal to noise ratio at the ear (Mozo, Murphy, and Ribera, 1995; Ribera et al., 1996; Mozo and Murphy, 1997; and Staton, Mozo, and Murphy, 1997). Use of combination protection, earplug in addition to the helmet, does provide the necessary hearing protection, but further compounds the problems associated with communications capability. While active noise reduction (ANR) provides exceptional low frequency hearing protection, it does little or nothing to improve protection for frequencies above 800 hertz. A U.S. Army Aeromedical Research Laboratory (USAARL) report (Mozo and Murphy, 1997) shows ANR does improve speech intelligibility when worn alone, but both hearing protectiOn and speech intelligibility are degraded when worn with ancillary equipment such as spectacles and chemical biological (CB) mask. Aircraft modification, system cost, lateral impact, weight, and others factors should be evaluated carefully when considering the use of ANR in the helicopter environment. The communications earplug (CEP) shown in the figure is a device which incorporates a miniature earphone with foam earplug and can be worn in combination with the aviator's helmet. Calculations show the CEP provides adequate hearing protection for 8 hours duty even in the high noise levels found in the H-53. The device also provides voice communication intelligibility which approaches asymptotic limits near 100 percent in thos e high noise environments. The system is lightweight, cos effective, and does not require modification of the aircraft wiring.
DTIC

Ear Protectors; Evaluation; Noise Intensity; Radio Communication; Telecommunication

19980010991 Institute for Human Factors TNO, Soesterberg, Netherlands

Interference Between 6 Degrees of Freedom in a 3D Hand Controller

Korteling, J. E., Institute for Human Factors TNO, Netherlands; Oving, A., Institute for Human Factors TNO, Netherlands; vanEmmerik, M. L., Institute for Human Factors TNO, Netherlands; vanErp, J. B. F., Institute for Human Factors TNO, Netherlands; Jul. 04, 1997; 41p; In English

Report No.(s): AD-A332586; TNO-TM-97-B010; TDCK-TD97-0227; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

A six degree of freedom (DOF) hand controller is a device that can be used for the simultaneous control of multiple axes. These kinds of control tasks are common in areas such as teleoperation. Multi-axis control may be problematic as a consequence of interference i.e., the control of a certain DOF affected the simultaneous control of another. Irrespective whether the cause of this interference lies in the operator's motor system or in his information processing system, it can be detrimental to task performance. When input on one DOF always results in undesired input on another DOF, the nature of this interference is systematic (cross-talk). The magnitude of the interference is probably affected by the number of DOFs that has to be controlled simultaneously. This was investigated in an experiment in which a compensatory tracking task was performed. In this task one DOF of a cursor in a perspective display was disturbed (externally). Subjects had to compensate this disturbance using a 6-DOF hand controller. At the same time they had to minimize input on the other (irrelevant to tracking) DOFs. It was investigated whether there were differences between tracking performance between each separate degree of freedom (X, Y, Z, Roll, Pitch, or Yaw). Furthermore, the effect of additional (irrelevant) DOFs that had to be controlled simultaneously (0, 1, or 5), was examined. With regard to the irrelevant degrees of freedom, the steering error thus was completely caused by incorrect, accidental, steering inputs. Error on the relevant DOF was a sum of this incorrect steering input and the disturbance signal. Both these errors (expressed in RMS scores) can be used to indicate the extent to which degrees of freedom interfered with each other.
DTIC

Degrees of Freedom; Controllers; Manual Control

19980011664 Army Aeromedical Research Lab., Fort Rucker, AL USA

Development of a Standard for the Health Hazard Assessment of Mechanical Shock and Repeated Impact in Army Vehicles. Phase 4--Experimental Phase *Final Report*

Cameron, Barbara, Army Aeromedical Research Lab., USA; Morrison, James, Army Aeromedical Research Lab., USA; Robinson, Dan, Army Aeromedical Research Lab., USA; Vukusic, Alen, Army Aeromedical Research Lab., USA; Martin, Steven, Army Aeromedical Research Lab., USA; Jan. 1996; 328p; In English

Contract(s)/Grant(s): Proj. 3O1-62787-A878

Report No.(s): AD-A332813; No Copyright; Avail: CASI; A15, Hardcopy; A03, Microfiche

Military Significance: New tactical ground vehicles developed by the U.S. Army are lower in weight and capable of higher speeds than their predecessors. This combination produces repetitive mechanical shocks that are transmitted to the soldier primar-

ily through the seating system. Under certain operating conditions, this exposure poses health and safety threats to the crew as well as performance degradation due to fatigue. The Army Surgeon General urgently required the Medical Research and Materiel Command to develop exposure standards for repetitive impacts that are relevant to the environment of soldiers operating modern tactical vehicles.
DTIC
Mechanical Shock; Medical Science; Surgeons; Health

19980011992 General Accounting Office, Washington, DC USA
Human Factors: FAA's Guidance and Oversight of Pilot Crew Resource Management Training Can Be Improved
Nov. 1997; 27p; In English
Report No.(s): AD-A332641; GAO/RCED-98-7; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

Airline travel is one of the safest modes of public transportation in the USA. The current level of airline safety has been achieved, in part, because the airline industry and government regulatory agencies have implemented rigorous pilot training and evaluation programs. The major airlines have training programs for pilots that focus on, among other things, maintaining flying skills, qualifying to fly new types of aircraft, and acquiring skills in dealing with emergencies. FAA'S original regulations for the airlines' general training programs-referred to in this report as part 121-spell out the number of hours of training required in particular areas, such as the time spent practicing emergency procedures. Effective for 1996, FAA instituted a requirement for CRM training under part 121 that states the following: 'After March 19, 1998, no certificate holder AIRLINE may use a person as a flight crewmember, and after March 19, 1999, no certificate holder may use a person as a flight attendant or aircraft dispatcher unless that person has completed approved crew resource management or dispatcher resource management initial training, as applicable, with that certificate holder or with another certificate holder.' FAA believes that this training should improve flight crews' performance.
DTIC
Aircraft Safety; Airline Operations; Commercial Aircraft; Flight Crews; Human Factors Engineering; Pilot Training; Civil Aviation

Subject Term Index

I

J

K

L

M

N

O

P

Q

R

S

T

U

V

W

X

Personal Author Index

T

V

W

Y

Z

Report Documentation Page

1. Report No.	2. Government Accession No.	3. Recipient's Catalog No.
NASA/SP—1998-7011/SUPPL460		

4. Title and Subtitle	5. Report Date
Aerospace Medicine and Biology A Continuing Bibliography (Supplement 460)	March 9, 1998
	6. Performing Organization Code

7. Author(s)	8. Performing Organization Report No.
	10. Work Unit No.
9. Performing Organization Name and Address	
NASA Scientific and Technical Information Program Office	11. Contract or Grant No.

12. Sponsoring Agency Name and Address	13. Type of Report and Period Covered
National Aeronautics and Space Administration Langley Research Center Hampton, VA 23681	Special Publication
	14. Sponsoring Agency Code

15. Supplementary Notes

16. Abstract

This report lists reports, articles and other documents recently announced in the NASA STI Database.

17. Key Words (Suggested by Author(s))	18. Distribution Statement
Aerospace Medicine Bibliographies Biological Effects	Unclassified – Unlimited Subject Category – 52

19. Security Classif. (of this report)	20. Security Classif. (of this page)	21. No. of Pages	22. Price
Unclassified	Unclassified	50	A03/HC

For sale by the NASA Center for AeroSpace Information, 800 Elkridge Landing Road, Linthicum Heights, MD 21090-2934